XIV. Prílohy

Príloha č.1

Menný zoznam pracovníkov k 31.12.2007

KATEGÓRIA	MENO	Druh / úväzok	Riešiteľská kapacita hod/rok
Vedúci vedecký pracovník DrSc	Doc. Ing. Dušan BEREK, DrSc.	HPP/100	T-2000
Vedúci vedecký pracovník DrSc	Prof. Ing. Tomáš BLEHA, DrSc.	HPP/100	T-2000
Vedúci vedecký pracovník DrSc	Prof. RNDr. Pavol HRDLOVIČ, DrSc.	HPP/80	T-1600
Vedúci vedecký pracovník DrSc	Prof. RNDr. Ignác CAPEK, DrSc.	HPP/60	T-1200
Vedúci vedecký pracovník DrSc	Ing. Lyda RYCHLÁ, DrSc.	HPP/100	T-2000
Vedúci vedecký pracovník DrSc	Ing. Jozef RYCHLÝ, DrSc.	HPP/100	T-2000
Vedúci vedecký pracovník DrSc	Prof. Ing. Ivan CHODÁK, DrSc.	HPP/100	T-2000
Vedúci vedecký pracovník DrSc	RNDr. Peter CIFRA, DrSc.	HPP/100	T-2000
Vedúci vedecký pracovník DrSc	Ing. Josef BARTOŠ, DrSc.	HPP/100	T-2000
Vedúci vedecký pracovník DrSc	Prof. Ing. Eberhard BORSIG, DrSc.	Emeritný	pracovník
Vedúci vedecký pracovník DrSc	Ing. Milan LAZÁR, DrSc.	Emeritný	pracovník
Vedúci vedecký pracovník DrSc	RNDr. Ferenc SZÖCS, DrSc.	Emeritný	pracovník
Vedúci vedecký pracovník PhD	Ing. Ivan LUKÁČ, PhD.	HPP/100	T-1600
Vedúci vedecký pracovník PhD	Doc. Ing. Štepán FLORIÁN, PhD.	HPP/40	T-600
Vedúci vedecký pracovník PhD	Ing. Dieter LATH, PhD.	HPP/70	T-1200
Vedúci vedecký pracovník PhD	Ing. Juraj PAVLINEC, PhD.	HPP/40	T-800
Samostatný vedecký pracovník PhD	Ing. Igor NOVÁK, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	RNDr. Jan PLAČEK, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Štefan CHMELA, prom. chem., PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Ing. Jozef LUSTOŇ, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Ing. Ivica JANIGOVÁ, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Ing. Mária OMASTOVÁ, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Ing. Igor LACÍK, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Ing. Vladimír POLLÁK, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Ing. Igor KRUPA, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Ing.Csaba KÓSA, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Mgr. Martin DANKO, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Mgr. Juraj KRONEK, PhD.	HPP/100	T-2000
Samostatný vedecký pracovník PhD	Mgr. Jaroslav MOSNÁČEK, PhD.	HPP/100	Z-T-2000
Samostatný vedecký pracovník PhD	Mgr. Peter KASÁK, PhD:	HPP/100	T-2000
Vedecký pracovník PhD	Ing. Ondrej ŽIGO, PhD.	HPP/100	T-2000
Vedecký pracovník PhD	Ing. Ľubica BÚCSIOVÁ, PhD.	HPP/100	T-2000
Vedecký pracovník PhD	Ing. Marián ŠTEVIAR, PhD.	HPP/100	T-2000
Vedecký pracovník PhD	Mgr. Silvia PODHRADSKÁ	HPP/100	T-2000
Vedecký pracovník PhD	Mgr. Zdenko ŠPITALSKÝ, PhD.	HPP/100	Z-T-2000
Vedecký pracovník PhD	Ing. Marek STACH, PhD.	HPP/100	T-2000
Vedecký pracovník PhD	Mgr. Jozef KOLLÁR, PhD.	HPP/100	Z-T-2000
Vedecký pracovník PhD	Ing. Gizela MIKOVÁ, PhD.	HPP/100	Z-T-2000
Vedecký pracovník PhD	Ing. Dušan RAČKO, PhD.	HPP/100	Z-T-2000
Vedecký pracovník PhD	Mgr. Zuzana BENKOVÁ, PhD.	HPP/100	T-2000
Vedecký pracovník PhD	Ing. Gabriela KOLLÁRIKOVÁ, PhD.	HPP/100	T-2000
Vedecký pracovník PhD	Mgr. Zuzana KRONEKOVÁ, PhD.	HPP/100	T-2000
Vedecký pracovník PhD	RNDr. Dušan CHORVÁTH, PhD.	HPP/100	T-900
Vedecký pracovník PhD	Ing. Matej MIČUŠÍK, PhD.	HPP/100	T-2000
Vedecký pracovník PhD	Mgr. Tomáš NEDELČEV, PhD.	HPP/100	T-2000

Vedecký pracovník PhD	Mgr. Peter PÁLENČÁR, PhD.	HPP/100	T-500
Odborný pracovník VŠ	Ing. Katarína CSOMOROVÁ	HPP/100	T-2000
Odborný pracovník VŠ	Ing. Dalimír JURČÁK	HPP/100	T-2000
Odborný pracovník VŠ	RNDr. Agnesa FIEDLEROVÁ	HPP/100	T-2000
Odborný pracovník VŠ	Ing. Ľudmila HRČKOVÁ	HPP/100	T-2000
Odborný pracovník VŠ	Ing. Angela KLEINOVÁ	HPP/100	T-2000
Odborný pracovník VŠ	Ing. Zuzana NÓGELLOVÁ	HPP/100	T-2000
Odborný pracovník VŠ	Mgr. Igor KOREŇ	VPP/20	T-400
Odborný pracovník VŠ	Ing. Zuzana HLOUŠKOVÁ	HPP/100	T-1500
Odborný pracovník VŠ	Ing. Mária ŠIVOVÁ	HPP/100	T-1500
Odborný pracovník VŠ	RNDr. Magdaléna KULÍČKOVÁ	HPP/100	O
Odborný pracovník VŠ	Mgr. Monika MAJERČÍKOVÁ	HPP/100	O
Odborný pracovník VŠ	Ing. Lenka FIALOVÁ	HPP/100	T-2000
Odborný pracovník VŠ	Ing. Daniela MOŠKOVÁ	HPP/100	T-2000
Odborný pracovník VŠ	Mgr. Branislav HUSÁR	HPP/100	T-2000
Odborný pracovník VŠ	Ing. Nadežda PETRENČÍKOVÁ	HPP/100	T-2000
Odborný pracovník ÚSV	Nadežda DANKOVÁ	HPP/100	
Odborný pracovník ÚSV	Jana LAVOVÁ	HPP/100	
Odborný pracovník ÚSV	Eva HIPKÁ	HPP/100	
Odborný pracovník ÚSV	Sidónia KALINOVÁ	HPP/100	
Odborný pracovník ÚSV	Oĺga JURÍKOVÁ	HPP/70	
Odborný pracovník ÚSV	Iveta NESTARCOVÁ	HPP/100	
Odborný pracovník ÚSV	Jana TARBAJOVSKÁ	HPP/100	
Odborný pracovník ÚSV	Anna ZUZÁKOVÁ	HPP/100	
Odborný pracovník ÚSV	Dagmar MAIEROVÁ	HPP/100	
Odborný pracovník ÚSV	Marta MITOŠINKOVÁ	HPP/100	
Odborný pracovník ÚSV	Jana FÁRYOVÁ	HPP/100	
Odborný pracovník ÚSV	Ivona HRODEKOVÁ	HPP/100	
Odborný pracovník ÚSV	Katarína CINOVÁ	HPP/100	
Odborný pracovník ÚSV	Zuzana KUŽELOVÁ	HPP/100	
Odborný pracovník ÚSV	Beáta KOSÍKOVÁ	HPP/100	
Odborný pracovník ÚSV	Alena ĎURIŠOVÁ	HPP/100	
Odborný pracovník ÚSV	Jozef KANDRÁČ	HPP/100	
Doktorand	Ing. Eva PÁPAJOVÁ	100	666
Doktorand	Ing. Štefan KURUC	100	NV
Doktorand	Ing. Helena ŠVAJDLENKOVÁ	100	2000
Doktorand	Ing. Lucia UČŇOVÁ	100	2000
Doktorand	Mgr. Katarína MRAVČÁKOVÁ	100	2000
Ostatní	Daniela PÍROVÁ	HPP/75	
Ostatní	Anna MIKULÁŠOVÁ	HPP/65	
Ostatní	Vilma ESSLEROVÁ	HPP/65	
Ostatní	Žofia BLUNÁROVÁ	HPP/65	
Ostatní	Zuzana ONDRUŠOVÁ	HPP/75	

T - tvorivý pracovník
O - nepracuje v oblasti výskumu a vývoja a ani sa nepodieľa na vedeckých výsledkoch
Z - dlhodobý pobyt v zahraničí bez prínosu k vedeckej aktivite pracoviska

Príloha č. 2

I. Domáce projekty riešené na pracovisku:

1. Vedecké projekty, ktoré boli v r. 2007 financované VEGA

1. Názov projektu:

Fenomenologické a mikroskopické aspekty štruktúry a ich súvislosti s dynamickými a transportnými vlastnosťami kondenzovaných systémov.
(Phenomenological and microscopic aspects of the structure and their connections with the dynamic and transport properties of condensed systems.)

Zodpovedný riešiteľ: **Bartoš Jozef**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2008**
Evidenčné číslo projektu: **2/6035/27**
Riešiteľská kapacita v hod/rok: **6 000**
Finančný príspevok VEGA: **106 000.-Sk**
Spoluriešiteľské inštitúcie: ***---***
Dosiahnuté výsledky:

V úsilí o detailné pochopenie PALS odozvy kondenzovaných sklotvorných systémov sa použil teoretický a modelingový prístup na prípade dvoch látok, ktoré tvoria vodíkové väzby: *propylén-glyko*l (PG) a *glycerol* (GL). Aplikácia adaptácie rozšíreného voľno-objemového modelu C o h e n a – G r e s t a (CG) odhalila, že jeho charakteristická teplota T_0(CG) je v aproximatívnej zhode s charakteristickou PALS teplotou T_{b1} z fenomenologickej analýzy PALS odozvy. Na druhej strane, aplikácia originálnej kavitačnej analýzy na statických mikroštruktúrach PG z molekulovo-dynamických simulácií potvrdila existenciu perkolovanej kavity prioritne nájdenej pre GL. Naviac, tento perkolačný fenomén je v obidvoch prípadoch lokalizovaný v blízkosti charakteristickej PALS teploty $T_{b2} > T_{b1}$. Diskrepancia medzi výsledkami teoretickej a mikroskopickej analýzy uvedených sklotvorných systémov poukazuje na zložitejšie fyzikálne pomery v látkach tohto typu odrážané PALS metódou.

Publikácie 2007:

1. BARTOŠ, Josef – RAČKO, Dušan – SAUŠA, O. - KRIŠTIAK, J.
   Positron annihilation lifetime spectroscopy and atomistic modeling – effective tools for the disordered condensed system characterization. Free volume from PALS and modeling. In SYLWESTER J. RZOSKA, S. J. - VICTOR A. MAZUR, V. A. Eds. Advanced Research Workshop. NATO Series. *Soft Matter under Exogenic Impacts. Fundamentals and Emerging Technologies*. Springer Verlag, Berlin, 2007, pp. 110–128.

2. RAČKO, Dušan – CHELLI, R. – CARDINI, G. – CALIFANO, S. – BARTOŠ, Josef
   Free volume from molecular dynamics simulations and its relationships to the positron annihilation lifetime spectroscopy. In *Theoretical Chemistry Accounts*. Vol. 118, (2007), pp. 443-448. (2.446 - IF_{2006})

2. Názov projektu:

Molekulová charakterizácia komplexných syntetických polymérov novými metódami kvapalinovej chromatografie.
(Molecular characterization of complex synthetic polymers by new methods of liquid chromatography.)

Zodpovedný riešiteľ: **Berek Dušan**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2008**
Evidenčné číslo projektu: **2/6016/27**
Riešiteľská kapacita v hod/rok: **4 900**
Finančný príspevok VEGA: **102 000.-Sk**
Spoluriešiteľské inštitúcie: ---
Dosiahnuté výsledky:

Rozbor vplyvu experimentálnych podmienok na šírku zóny v kvapalinovej chromatografii pri limitných podmienkach desorpcie (LC LCD). Potvrdil sa predpoklad o výraznej fokusácii chromatografických zón v dôsledku účinku bariéry kvapaliny, ktorá podporuje adsorpciu vzorky polyméru (adsorli). To umožňuje do kolóny dávkovať veľký objem vzorky, v chromatografických metódach dosiaľ nezaznamenaný - až 25% celkového objemu kolóny. Súčasne LC LCD kolóna dokáže selektívne zadržať aj vysokú koncentráciu vzorky, možno dávkovať koncentrované roztoky polymérov - až 1%. Tým významne vzrastie vzorková kapacita kolóny a otvára sa možnosť separácie a identifikácie veľmi malých vzoriek, ktoré by boli inak maskované nadbytkom sprevádzajúcej makromolekulovej látky.

Publikácie 2007:

1. REIJENGA, J. C. – KINGMA, W. J. – BEREK, Dušan – HUTTA, M.
   GPCSIM – an instrument simulator of polymer analysis by size exclusion chromatography for demonstration and training purposes. In *Acta Chimica Slovenica*. Vol. 54, (2007), pp. 79-87. (0.703 - IF_{2006})
2. RUSS, A. – BEREK, Dušan
   Enthalpy assisted size exclusion chromatography. Part 2. Adsorption retention mechnism. In *Journal of Separation Science*. Vol. 30, (2007), pp. 1852–1859. (2.535 - IF_{2006})
3. SHUNDO, A. - FUKUI, M. – TAKAFUJI, M. – AKASAKA, K. – OHRUI, H. – BEREK, Dušan – IHARA, H.
   Selectivity enhancement for *trans*-2-(2,3-Anthracenedicarboximido)cyclohexane-derived diastereomers in HPLC by using an ordered organic stationary phase. In *Analytical Sciences*. Vol. 23, (2007), pp. 1-5. (1.589 - IF_{2006})
4. ŠAUŠA, O. – KRIŠTIAK, J. – BEREK, Dušan – ISKROVÁ, M.
   Column packings for high-performance liquid chromatography and positron annihilation lifetime spectroscopy. In *Radiation Physics and Chemistry*. Vol. 76, (2007), pp. 271 – 274. (0.868 - IF_{2006})
5. YILDIZ, U. - CAPEK, Ignác - BEREK, Dušan - SAROV, Y. - RANGELOW, I.W.
   Inverse microemulsion copolymerization of butyl acrylate and acrylamide: kinetics, colloidal parameters and some model applications. In *Polymer International*. Vol. 56, (2007), p. 364-370. (1.475 - IF_{2006})

3. Názov projektu:

Štatistická termodynamika polymérnych a koloidných sústav.
(Statistical thermodynamics of polymer and colloid systems.)

Zodpovedný riešiteľ: **Bleha Tomáš**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2008**

Evidenčné číslo projektu: **2/6014/27**
Riešiteľská kapacita v hod/rok: **4 600**
Finančný príspevok VEGA: **66 000.-Sk**
Spoluriešiteľské inštitúcie: ---
Dosiahnuté výsledky:

Pomocou molekulových simulácií sa skúmali elastické vlastnosti makromolekúl v rámci červovitého modelu reťazcov (WLC) pri rôznych teplotách. Vypočítala sa voľná energia a sila pri deformácii makromolekúl cez vzdialenosť koncov *R* pre rôzne tuhosti reťazcov. V oblasti nižších teplôt sa na týchto krivkách objavili diskontinutity charakteristické pre vznik zbalených štruktúr. Vypočítané závislosti sily od teploty sa využili na posúdenie termoelasticity polotuhých a tuhých makromolekúl. Doteraz boli termoelastické vlastnosti vypočítané iba v prípade ohybných (kaučukovitých) polymérov. Ďalej sa prešetrovali vlastnosti tuhých a polotuhých makromolekúl v kanáloch či póroch rôzneho tvaru. Vyhodnotili sa zmeny štruktúrnych parametrov reťazcov (perzistentná dĺžka, stredné vypriamenie reťazca) ako aj ich usporiadania, ktoré sú vyvolané geometrickým obmedzením. Ukázali sme, ako sa „pravá" perzistentná dĺžka voľného reťazca mení pri geometrickom obmedzení reťazca na zjavnú veličinu. Pritom v štrbine a vo valci zjavná perzistentná dĺžka narastá so zväčšovaním obmedzenia, zatiaľ čo v guľovej dutine klesá. Rôzne štruktúrne charakteristiky polotuhých reťazcov vypočítané zo simulácií sa použili pri interpretácii experimentálnych údajov z literatúry týkajúcich sa dvojvláknovej DNA a bielkoviny aktínu v štrbinách či obdĺžnikových kanáloch a v guličkách mikroemulzií.

Publikácie 2007:

1. CIFRA, Peter – BLEHA, Tomáš
   Stretching of self-interacting wormlike macromolecules. In *Polymer*. Vol. 48, (2007), pp. 2444 – 2452. (2.773 - IF_{2006})

2. CIFRA, Peter – BLEHA, Tomáš
   Elastic properties of semi-flexible chains and networks. In *Macromolecular Symposia*. Vol. 256, (2007), pp. 105-111. bez IF

4. Názov projektu:

Nanokompozitné disperzie založené na prírodných a syntetických polyméroch a kovových aditívach.
(On nanocomposite dispersions based on synthetic and natural polymer and metal additives.)

Zodpovedný riešiteľ: **Capek Ignác**
Dátum začiatku/ukončenia riešenia projektu: **01.2007 – 12.2009**
Evidenčné číslo projektu: **2/7013/27**
Riešiteľská kapacita v hod/rok: **10 600**
Finančný príspevok VEGA: **220 000.-Sk**
Spoluriešiteľské organizácie: ---
Dosiahnuté výsledky:

Príprava nanokompozitných častíc radikálovou polymerizáciou a kopolymerizáciou nenasýtených monomérov v micelárnych roztokoch. Sledovanie vzťahu medzi kinetickými parametrami (mini)emulznej polymerizácie a koloidnými, optickými a magnetickými vlastnosťami pripravených disperzií. Štúdium molekulovej hmotnosti polymérov a polymér-kovových častíc.

Publikácie 2007:

1. CAPEK, Ignác - FIALOVÁ, Lenka - BEREK, Dušan
On kinetics of inverse emulsion polymerization of acrylamide. *Designed Monomers and Polymers (submitted)*

5. Názov projektu:

Nanoškálové simulácie (bio)makromolekulových systémov s priestorovými a fázovými rozhraniami.
(Nanoscale simulations of (bio)macromolecular systems with geometrical confinement and interfaces.)

Zodpovedný riešiteľ: **Cifra Peter**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2008**
Evidenčné číslo projektu: **2/6116/27**
Riešiteľská kapacita v hod/rok: **3 400**
Finančný príspevok VEGA: **60 000.-Sk**
Spoluriešiteľské inštitúcie: **---**
Dosiahnuté výsledky:

V minulom roku pozorovaná asymetrická konformácia pri prevliekaní tuhej makromolekuly medzi kanálom prepojenými dutinami bola v súčasnosti vysvetlená v spolupráci s dvomi zahraničnými kolegami ako dôsledok energetického príspevku pri obmedzovaní, ktorý je spojený s ohýbaním reťazca. Rozdeľovanie makromolekúl do obmedzujúceho priestoru je zatiaľ chápané hlavne ako entropický jav, čo je dôsledkom teoretických predstáv postavených na ohybných reťazcoch. Ukazuje sa, že tieto predstavy je potrebné pre tuhé makromolekuly modifikovať a energetický príspevok pri rozdeľovaní makromolekúl medzi rôzne obmedzujúcimi prostrediami môže byť markantný.

Podobne s ďalším zahraničným kolegom sme sa venovali vyhodnoteniu počtu zauzlenín, priamo uzlov, v silne sféricky obmedzených tuhých makromolekulách. Takéto štúdie existujú už pre ohybné reťazce, ale vplyv tuhosti reťazca zatiaľ chýba hoci sa priamo môže týkať genomických makromolekúl v schránkach (bakteriofágy). Zatiaľ sú k dispozícii len predbežné výsledky.

Publikácie 2007:

1. CIFRA, Peter – BLEHA, Tomáš
Free energy of deformation of the radius of gyration in semiflexible chains. In *Macromolecular Theory and Simulation*. Vol. 16, (2007), pp. 501-512. (1.073 - IF_{2006})

6. Názov projektu:

Príprava a charakteristika fotocitlivých makromolekulových systémov a modelových látok pre konštrukciu značiek a senzorov.
(Preparation and characteristics of photosensitive macromolecular systems and model compounds for construction of probes and sensors.)

Zodpovedný riešiteľ: **Hrdlovič Pavol**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2008**
Evidenčné číslo projektu: **2/6015/27**
Riešiteľská kapacita v hod/rok: **9 000**
Finančný príspevok VEGA: **187 000.-Sk**
Spoluriešiteľské inštitúcie: **---**
Dosiahnuté výsledky:

Spektrálne sa charakterizoval jednoduchý chromofór na báze aminoftalimidu, ktorý vykazuje výraznú závislosť na polarite prostredia. S rastúcou polaritou prostredia vykazuje silný batochrómny posun fluorescencie, zníženie jej intenzity a výrazne skrátenie doby života. Rozpracovala sa príprava značky na báze tohto chromofóru s viacerými radikálovými centrami.

Pripravili sa a spektrálne charakterizovali sa nové typy značiek, kde chromofór typu 1,8-naftylimidu spája dve radikálové centrá na báze stéricky tieneného amínu - HAS. Jedna štruktúrna jednotka HAS je v polohe 4 na kruhu 1,8-naftylimidu a druhá štruktúrna jednotka je viazaná ako imid. Porovnali sa spektrálne vlastnosti parentného amínu, alkoxy derivátu a biradikálu. Rozsah vnútromolekulového zhášania v dôsledku prítomnosti biradikálového centra je v intervale 10–70 v závislosti od prostredia.

Pripravil sa nový styrénový monomér s viazaným benzilovým chromofórom (1-fenyl-2-{4-[2-(4-vinylbenzyloxy)etoxy]fenyl}-etán-1,2-dion a jeho kopolymér so styrénom s náhodnou distribúciou benzilových štruktúrných jednotiek. Expozíciou žiarením s λ>400 nm na vzduchu sa bočné benzilové skupiny transformovali na benzoylperoxidové, ktoré sa teplom rozložili za tvorby esterov a kyseliny benzoovej, pričom sa vytvorila hustá homogénna sieť v polystyrénovom filme.

V spolupráci s Ústavom polymérov (CSIC) v Madride (Dr. T. Corrales a Dr. C. Peinado) sa sledovala fotoperoxidácia a rozklad vytvorených peroxidov vo filme polyméru pomocou fluorescencie a chemiluminiscencie. Intenzita chemiluminiscencie závisela od koncentrácie peroxidov. Pri ich tvorbe stúpala a pri rozklade klesala. Stupeň fotoperoxidácie sa dá sledovať aj z úbytku emisie 1,2-dikarbonylovej skupiny. Monomérna emisia fluorescenčných značiek ako di(1-pyrénmetyl) éter (DIPYM) a pyrén sa zvyšovala so stupňom fotoperoxidácie. Príčinou je zvýšenie podielu svetla absorbovaného značkou v dôsledku zníženia koncentrácie (absorbcie) 1,2-dikarbonylového zoskupenia. Počas rozkladu fotochemicky vytvoreného benzoylperoxidu teplom dochádza k adícii benzoyl radikálov aj na aromatický systém pyrénu a tým k poklesu jeho emisie. Hodnotí sa možnosť využitia excimérnej emisie DIPYM-u závislej od veľkosti voľného objemu na stanovenie hustoty polymérnej siete.

Prvýkrát sa pripravila látka obsahujúca dve štruktúry fenyltrifluórometyl ketónu. Látka má slúžiť ako fotosieťovacie činidlo najmä pre sieťovanie tenkých filmov polymérov na rôznych povrchoch.

Publikácie a prezentácie 2007:

1. BÚCSIOVÁ, Ľubica – HRDLOVIČ, Pavol
   Medium effect of polymer matrices on spectral properties of 4-aminophthalimide and 4-dimethylaminophthalimide. In: *Journal of Macromolecular Science, Part A: Pure and Applied Chemistry*. Vol. 44, (2007), pp. 1047-1053. (0.800- IF_{2006})

2. HRDLOVIČ, Pavol – CHMELA, Štefan – DANKO, Martin – SARAKHA, M. – GUYOT, G.
   Spectral properties of probes containing benzothioxanthene chromophore linked with hindered amine in solution and in polymer matrices. In *Journal of Fluorescence*. doi: 10.1007/s10895-007-0279-9.

3. HUSÁR, Branislav – LUKÁČ, Ivan
   Synthesis, photoperoxidation and crosslinking of styrene copolymer with pendant benzyl moieties. *Journal of Photochemistry and Photobiology, Part A, Chemistry* doi:10.1016/j.jphotochem.2007.10.001.

4. KOLLÁR, Jozef – HRDLOVIČ, Pavol – CHMELA, Štefan
   Synthesis and spectral characteristics of di-substituted 1,8-naphthalimides; bi-radical formation. *Journal of Photochemistry and Photobiology Part A, Chemistry* doi:10.1016/j.jphotochem.2007.09.008.

5. MATISOVÁ-RYCHLÁ, Lyda – RYCHLÝ, Jozef – DANKO, Martin – CHMELA, Štefan – HRDLOVIČ, Pavol

On the stabilizing effect of sterically hindered amines and nitroxide radicals in thermal and photo-oxidation of polypropylene. In In REICHERT, T. Ed. *Book of Natural and Artificial Ageing of Polymers, 3rd European Weathering Symposium, CEES Publication No. 8, , September 12-14, 2007, Krakow. Poland.* p. 141-152.

6. DANKO, Martin – HRDLOVIČ, Pavol – CHMELA, Štefan
The photolysis of dyes containing benzothioxanthene chromophore linked with hindered amine in polymer matrices. In *Chemické Listy.* Vol. 101, S, (2007), ISSN 0009-2770. s. s49-s50 - *Abstract Book of International Conference Polymeric Materials in Automotive & 19th Slovak Rubber Conference, May 15-17, 2007, Bratislava, Slovak Republic.* (0.445 - IF_{2005}) Výveska P-11

7. DANKO, Martin - LIBISZOWSKI, J. - WOLSZCZAK, M. - RAČKO, Dušan - DUDA, A. Molecular dynamics of star-shaped poly(ε-caprolactone) in tetrahydrofuran solution followed by fluorescence spectroscopy. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 60. Prednáška

8. KOLLÁR, Jozef – HRDLOVIČ, Pavol – CHMELA, Štefan
Synthesis and spectral characteristics of substituted 1,8-naphthalimides. In *Programme and Book of Abstracts of European Polymer Congress 2007, July 1-5, 2007, Portorož, Slovenia.* p. 197. Výveska P 1.4.80.

9. LUKÁČ, Ivan – HUSÁR, Branislav
Synthesis, photoperoxidation and crosslinking of styrene copolymers with pendant benzil moieties. In *Book of Abstracts of XXIII International Conference of Photochemistry, July 29-August 3, 2007, Cologne, Germany.* ISBN 3-936028-465-1.p. 521. Výveska P 277

7. Názov projektu:
Výskum elektro-optických vlastností nových organických zlúčenín ako prekurzorov pre prípravu materiálov aplikovateľných v elektronike a nano-technologií.
(Study of electrooptical properties of novel organic compounds as precursor for preparation of material applied to electronic and nanotechnology.)

Zodpovedný riešiteľ: Lukeš Vladimír
Riešiteľ za ÚPo: **Hrdlovič Pavol**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2008**
Evidenčné číslo projektu: **1/3036/27**
Riešiteľská kapacita v hod/rok: **300**
Finančný príspevok VEGA: **7 000.-Sk**
Spoluriešiteľské inštitúcie: **Ústav fyzikálnej chémie a chemickej fyziky FCHPT STU**
Dosiahnuté výsledky:

Pripravili sa a spektrálne charakterizovali experimentálne a teoreticky oligotiofény terminované na jednom konci (séria A) alebo na oboch koncoch (séria B) s (9H-fluoren-9-ylidene)metyl chromofórom. Absorpčné spektrá zlúčenín v oboch sériach predstavujú široký pás, ktorý sa batochrómne posúva s rastom tiofénových jednotiek. Fluorescencia sa pozoruje pre sériu B, pričom Stokesov posun je okolo 5 000 cm^{-1}, čo indikuje zmeny v geometrii molekúl v excitovanom stave. Zmeny planarity medzi fluorénovým s tiofénovými chromofórmi v základnom a excitovanom stave boli teoreticky charakterizované.

Publikácie a prezentácie 2007:

1. LUKEŠ, V. – MATIS, M. – VÉGH, D. – HRDLOVIČ, Pavol – LAURINC, V.
Structure, electronic and optical characterization of oligothiophenes terminated with (9H-gluoren-9-ylidene)methyl chromophores.. In *Synthetic Metals.* doi:10.1016/j.synthmet.2007.08.011

2. LUKEŠ, V. – MATIS, M. – VÉGH, D. – HRDLOVIČ, Pavol – LAURINC, V.
Structure, electronic and optical characterization of oligothiophenes terminated with (9H-gluoren-9-ylidene)methyl chromophores. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 120. Vývеska 3Po-Po42.

8. Názov projektu:

Nové postupy prípravy modifikovaných polymérov na báze polypropylénu a polylaktidov so špecifickou štruktúrou s využitím nových typov iniciátorov a značiek.
(New procedures for preparations of modified polymers on the base of polypropylene and polylactides with specific structure by utilizing of new types of initiators and probes.)

Zodpovedný riešiteľ: **Chmela Štefan**
Dátum začiatku/ukončenia riešenia projektu: **01.2005 – 12.2007**
Evidenčné číslo projektu: **2/5108/27**
Riešiteľská kapacita v hod/rok: **13 700**
Finančný príspevok VEGA: **284 000.-Sk**
Spoluriešiteľské inštitúcie: ---
Dosiahnuté výsledky:

Jednou z možných príčin straty účinnosti svetelných a tepelných stabilizátorov v nanokompozitoch predstavuje silná interakcia stabilizátora s nanoplnivom. V polymérnom nanokompozite je sledovanie tejto interakcie veľmi obtiažne, vzhľadom na malé zmeny spektrálnych vlastností spôsobených vzájomnou interakciou. Interakcie nanoplniva so stabilizátorom sa sledovali v modelovom systéme cyklohexánu pomocou UV absorbcie (nepolárny cyklohexán sa vybral ako vhodný model za nepolárny polypropylén). Študovanými vzorkami boli prírodný montmorillonit Cloisite Na^+, a tri modifikované montmorilonity s prímesou kvartérnej amóniovej soli: Cloisite 10A, Cloisite 15A a Cloisite 20A. Koncentrácia nanoplniva bolo vo vzorkách v množstve 1,3 a 5 hmot. %. Testoval sa komerčne vyrábaný oligomérny stabilizátor typu HAS/Hindered Amine Stabilizer/Chimasorb 944 a nízkomolekulový syntetizovaný ester 2,2,6,6-tetrametylpiperidinolu obsahujúci naftylovú absorbujúcu skupinu - NMP. Vo všetkých prípadoch sa potvrdila interakcia nanoplniva s použitými stabilizátormi. Výrazne silnejšia interakcia v prípade Chimasorbu súvisí s jeho molekulovou hmotnosťou a vyšším počtom interakčných skupín v molekule v porovnaní s nízkomolekulovým NMP. Množstvo adsorbovaného stabilizátora na plnivo sa výrazne zvyšovalo so zvyšovaním koncentrácie nanoplniva v cyklohexáne. Uvedená metóda sa môže využiť ako prvá selekcia pri výbere možného stabilizačného systému pre polymérne nanokompozity.

Absorpčná a emisná spektroskopia ako aj laserová zábleskova fotolýza bola využitá na spektrálnu charakterizáciu série dvojfunčných fluorescenčných značiek. Túto sériu predstavovalo spojenie chromofóru benztioxantónu – BTX, kovalentne viazaného s 2,2,6,6-tetrametylpiperidínom – TMP, ktorý bol vo forme parentného amínu – BTX-NH, stabilného nitroxylového radikálu – BTX-NO a substituovaného hydroxylamínu – BTX-NOR. Chromofór benztioxantón vykazuje silnú absorpciu a najmä emisiu v oblasti 520 nm prejavujúcu sa silnou žlto-oranžovou fluorescenciou. Spektrálne vlastnosti sú výrazne ovplyvňované rozpúšťadlom resp. polymérnou matricou. Zánik fluorescencie je ovplyvnený charakterom radikálového centra TMP. BTX-NO vykazoval biexponenciálny zánik, čo je vysvetlené existenciou dvoch rozdielnych stérických usporiadaní, z ktorých iba jedna forma je schopná zhášať excitovaný stav chromofóru prítomným nitroxylovým radikálom. Pomer kvantových výťažkov parentného amínu BTX-NH a stabilného nitroxylového radikálu BTX-NO, ktorý charakterizuje účinnosť vnútromolekulového zhášania excitovaného stavu chromofóru bol 4-9 v závislosti od polarity

rozpúšťadla resp. polymérnej matrice. Tripletný stav vykazuje tranzičné absorpčné spektrum s maximom pri 530 nm.

Publikácie 2007:

1. CHMELA, Štefan – FIEDLEROVÁ, Agnesa – BORSIG, Eberhard – ERLER, J. – MÜLHAUPT, R.
   Photo-oxidationand stabilization of sPP and iPP/Boehmite dispersal nanocomposites. In *Journal of Macromolecular Science Part A-Pure and Applied Chemistry*. Vol 44, (2007), pp. 1027-1034. (0.800- IF_{2006})

9. Názov projektu:

Charakterizácia štruktúry modifikovaných viacfázových polymérnych materiálov a jej vplyv na vlastnosti.
(Characterization of structure of modified multiphase polymeric systems and its influence on properties.)

Zodpovedný riešiteľ: **Chodák Ivan**
Dátum začiatku/ukončenia riešenia projektu: **01.2007 – 12.2009**
Evidenčné číslo projektu: **2/7103/27**
Riešiteľská kapacita v hod/rok: **19 800**
Finančný príspevok VEGA: **408 000.-Sk**
Spoluriešiteľské inštitúcie: **---**
Dosiahnuté výsledky:

Začalo sa detailné štúdium vplyvu mechanickej deformácie na elektrickú vodivosť elastomérov plnených vodivými sadzami. Popri jednoosej deformácii sa sledoval aj efekt relaxácie kompozitov v napätom stave. Zistili sa výrazné rozdiely týkajúce sa priebehu vodivosti od deformácie, v závislosti od použitej matrice, ale dokonca aj od geometrie upevnenia vzorky.

10. Názov projektu:

Modifikácia polymérnych zmesí a kompozitov s obsahom biodegradovateľných polymérov a biopolymérov z obnoviteľných zdrojov.
(Modification of polymer blends and composites containing biodegradable polymers and biopolymers from renewable sources.)

Zodpovedný riešiteľ: Alexy Pavol
Riešiteľ za ÚPo: **Chodák Ivan**
Dátum začiatku/ukončenia riešenia projektu: **01.2007– 12.2009**
Evidenčné číslo projektu: **2/4455/27**
Riešiteľská kapacita v hod/rok: **7 000**
Finančný príspevok VEGA: **79 000.-Sk**
Spoluriešiteľské inštitúcie: **FChPT STU – Ústav polymérnych materiálov**
Dosiahnuté výsledky:

Detailne sa stanovili vplyvy zloženia materiálu a spôsobu jeho spracovania na morfológiu a s ňou súvisiace vlastnosti u zmesí s obsahom biodegradovateľných polymérov. Ako matrice sa použili elastoméry, polyhydroxybutyrát a polykaprolaktón, ako prísady sa testovali lignín a rôzne typy termoplasticky modifikovaných škrobov.

11. Názov projektu:

Príprava a vlastnosti organicko/anorganických nanokompozitov na báze sól-gél procesov využitím organofunkčných silánov.
(Preparation and properties of organic/inorganic nanocomposites based on sol−gel processes using organofunctional silanes.)

Zodpovedný riešiteľ: **Krupa Igor**
Dátum začiatku/ukončenia riešenia projektu: **01.2006– 12.2008**
Evidenčné číslo projektu: **2/6114/27**
Riešiteľská kapacita v hod/rok: **13 600**
Finančný príspevok VEGA: **220 000.-Sk**
Spoluriešiteľské inštitúcie: ---
Dosiahnuté výsledky:

Pripravili a študovali sme nové typy vysoko elektricky a tepelne vodivých kompozitov na báze polyetylénu a pokovených polymérnych častíc. Ukázalo sa, že pri takejto morfológii už veľmi malá koncentrácia striebra (niekoľko objemových %) postačuje na výrazne zvýšenie tak elektrickej ako aj tepelnej vodivosti kompozitov.

Publikácie 2007:

1. NEDELČEV, Tomáš - KRUPA, Igor – CSOMOROVÁ, Katarína – JANIGOVÁ, Ivica – RYCHLÝ, Jozef
   Synthesis and characterization of the new silane-based antioxidant containing 2,6-di-*tert*-butyl phenolic stabilizing moiety. In *Polymers for Advanced Technologies.* Vol. 18, (2007), p. 157-164. (1.406 - IF_{2006})

2. KRUPA, Igor – MIKOVÁ, Gizela – NOVÁK, Igor – JANIGOVÁ, Ivica – NÓGELLOVÁ, Zuzana – LEDNICKÝ, F. – PROKEŠ, J.
   Electrically conductive composites of polyethylene filled with polyamide particles coated with silver. In *European Polymer Journal*. Vol. 43, (2007), pp. 2401-2413. (2.113 - IF_{2006})

3. KRUPA, Igor – BOUDENNE, A. – IBOS, L.
   Thermophysical properties of polyethylene filled with metal coated polyamide particles. In *European Polymer Journal*. Vol. 43, (2007), pp. 2443–2452. (2.113- IF_{2006})

12. Názov projektu:

Nové hypervetvené polyméry s nesymetrickou a neregulárnou štruktúrou.
(Novel hyperbranched polymers with non-symetrical and irregular structure.)

Zodpovedný riešiteľ: **Lustoň Jozef**
Dátum začiatku/ukončenia riešenia projektu: **01.2006– 12.2008**
Evidenčné číslo projektu: **2/6117/27**
Riešiteľská kapacita v hod/rok: **8 000**
Finančný príspevok VEGA: **91 000.-Sk**
Spoluriešiteľské inštitúcie: **---**
Dosiahnuté výsledky:

Študovali sa polyadičné reakcie typu AB a AA+BB s využitím monomérov obsahujúcich naftalénovú (A) a bifenylovú skupinu (B). Obidva typy polymerizácií sú založené na adičných reakciách 2-oxazolínového cyklu s karboxylovou alebo hydroxylovou skupinou. Získali sa polyméry so zvýšenou tepelnou stabilitou, pričom u polymérov s vhodnou kombináciou tuhých a flexibilných segmentov v molekule sa predpokladá vznik kvapalno-kryštalickej fázy . Medzi takéto zlúčeniny patria aj bifenylové deriváty, keďže bifenylová skupina patrí medzi tradičné mezogény. V obidvoch prípadoch sa sledoval vplyv štruktúry monomérov a polymerizačných

podmienok na vlastnosti pripravených polymérov. Ako už bolo naznačené, sledovala sa štruktúra polymérov a ich termické ako aj fotochemické vlastnosti. Uvedené polyméry majú perspektívne využitie vo viacerých oblastiach materiálovej technológie, pričom možno uvažovať s použitím samotných polymérov alebo v kombinácii s inými materiálmi (kompozity, polymérne zmesi).

Publikácie a prezentácie 2007:

1. LANGER, V.– SCHOLTZOVÁ, E. – GYEPESOVÁ, D. – LUSTOŇ, Jozef – KRONEK, Juraj
   2-(2-Oxazolin-2-yl)benzene-1,4-diol: X-ray and density functional theory studies. In *Acta Crystallographica Section C – Crystal Structure Communications*. Vol.C63, (2007), pp. o187-o189. (0.896- IF_{2006})

2. LUSTOŇ, Jozef – KRONEK, Juraj – MARKUS, O. – JANIGOVÁ, Ivica – BÖHME, F.
   Synthesis and polymerization reactions of cyclic imino ethers. 3. Poly(ester amide)s of the AA+BB type on the basis of 2-oxazolines. In *Polymers for Advanced Technologies*. Vol. 18, (2007), pp.165–172. (1.406 - IF_{2006})

3. LUSTOŇ, Jozef – KRONEK, Juraj
   Synthesis and polymerization reactions of cyclic imino ethers. II. Preparation of novel hyperbranched polymers from AB_2 monomers of 2-oxazoline type with nonequivalent B units.In *Polymer Engineering and Science*. Vol. 47, (2007), pp. 1272–1280. (1.611- IF_{2006})

13. Názov projektu:

Fyzikálne vlastnosti vodivých polymérov, vodivých polymérnych kompozitov a nových konjugovaných systémov.
(Physical properties of conducting polymers, conducting polymer nanocomposites and new conjugated systems.)

Zodpovedný riešiteľ: Fedorko Pavol (FCHPT STU, Bratislava)
Riešiteľ za ÚPo: **Omastová Mária**
Dátum začiatku/ukončenia riešenia projektu: **01.2005 – 12.2007**
Evidenčné číslo projektu: **1/2021/05**
Riešiteľská kapacita v hod/rok: **1 800**
Finančný príspevok VEGA: **26 000.-Sk**
Spoluriešiteľské inštitúcie: **Ústav fyzikálnej chémie a chemickej fyziky FCHPT STU, Bratislava**

Dosiahnuté výsledky:

Pripravil sa nový typ vodivého kompozitu, karbid kremíka/polypyrol (SiC/PPy) s aj bez prítomnosti aniónového tenzidu, dodecylbenzénsulfónovej kyseliny (DBSA). Povrchová modifikácia SiC prebehla vo vodnom roztoku chemickou oxidačnou polymerizáciou pyrolu, použitím chloridu železitého ako oxidantu. Vodivosť SiC-DBSA/PPy kompozitov závisela od obsahu PPy na povrchu častíc SiC a tiež od molárneho pomeru pyrol/DBSA a bola o 2 rády vyššia než v prípade kompozitov pripravených bez prítomnosti DBSA. Povrchové chemické zloženie kompozitov bolo stanovené pomocou fotoelektrónovej röntgenovej spektroskopie. Po rozdispergovaní SiC-DBSA/PPy kompozitov vo vode bolo zistené, že tieto sa nezmáčajú a zostávajú na vodnej hladine pretože PPy obsahuje značné množstvo naviazaného tenzidu, ktorý spôsobí, že pripravený kompozit je hydrofóbny. Potvrdilo sa, že tenzid je zabudovaný do PPy štruktúry, ktorý tvorí obal častíc, čo je možné využiť na prípravu nových druhov vodivých častíc, prípadne plnív.

Pokračovalo sa v štúdiu vplyvu reakčných podmienok na vlastnosti vodivého polyméru - polypyrolu (PPy), ktorý bol syntetizovaný chemickou oxidačnou polymerizáciou monoméru vo vodnom prostredí použitím rôznych oxidačných činidiel. Prešetril sa vplyv koncentrácie nového

typu, oxidačného činidla $Ce(SO_4)_2$ na elektrickú vodivosť a stabilitu PPy. Merná elektrická vodivosť PPy pripraveného vo vodnom prostredí použitím molárneho pomeru pyrol/oxidant = 1 bola cca 1 $S \cdot cm^{-1}$. Rádovo nižšia hodnota vodivosti bola nameraná pri vyšších molárnych pomeroch. Pri vyšom mólovom pomere ako jedna zrejme dochádza k oxidácii PPy a tým narušeniu konjugácie PPy reťazca, čo sa prejaví znížením jeho mernej vodivosti.

Publikácie 2007:

1. MIČUŠÍK, Matej – OMASTOVÁ, Mária – BOUKERMA, K. – ALBOUY, A. – CHEHIMI, M. M. – TRCHOVÁ, M. – FEDORKO, P.
   Preparation, surface chemistry, and electrical conductivity of novel silicon carbide/polypyrrole composites containing an anionic surfactant. In *Polymer Engineering and Science*. Vol. 47, (2007), pp. 1198–1206. (1.414- IF_{2006})

2. MIČUŠÍK, Matej – OMASTOVÁ, Mária – TRCHOVÁ, M. – FEDORKO, P. – CHEHIMI, M. M.
   Preparation, surface chemistry and electrical conductivity of silicon carbide/polypyrrole composites. In *Programme and Book of Abstracts of European Polymer Congress 2007, July 1-5, 2007, Portorož, Slovenia.* p. 219 + 2pg on CD.

3. OMASTOVÁ, Mária – MIČUŠÍK, Matej – TRCHOVÁ, M. – FEDORKO, P. – CHEHIMI, M. M.
   Vlastnosti kompozitov SIC/polypyrol pripravených v prítomnosti aniónových tenzidov. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 190.

14. Názov projektu:

Pôsobenie iónových zlúčenín na termickú ko-oxidaciu celulózy a lignínu.
(The effect of ionic compounds on the thermal co-oxidation of cellullose and lignin.)

Zodpovedný riešiteľ: **Rychlá Lyda**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2008**
Evidenčné číslo projektu: **2/6115/27**
Riešiteľská kapacita v hod/rok**: 8 000**
Finančný príspevok VEGA: **166 000.-Sk**
Spoluriešiteľské inštitúcie: ---
Dosiahnuté výsledky:

Starnutie vzoriek papiera svetlom je vždy doprevádzané znižovaním pH a zvyšovaním kyslosti vodného výluhu. U vzorky skladajúcej sa z niekoľkých vrstiev a starnutej na svetle má horná vrstva najnižšie pH, rovnako ako počet dvojohybov a mechanickú stabilitu, ale rýchlostná konštanta oxidácie určená z chemiluminiscenčných meraní pri 105°C je najvyššia. Deacidifikované vzorky papiera pomocou uhličitanov alkalických kovov pritom majú výrazne nižšiu rýchlostnú konštantu oxidácie pri 105°C ako pôvodné vzorky.

15. Názov projektu:

Vplyv vody na radikálovú oxidáciu polymérov.
(The effect of water on free radical oxidation of polymers.)

Zodpovedný riešiteľ: **Rychlý Jozef**
Dátum začiatku/ukončenia riešenia projektu: **01.2005 – 12.2007**
Evidenčné číslo projektu: **2/5109/27**
Riešiteľská kapacita v hod/rok**: 4 800**
Finančný príspevok VEGA: **100 000.-Sk**
Spoluriešiteľské inštitúcie: ---

Dosiahnuté výsledky:

Bol vysvetlený mechanizmus vzniku svetelnej emisie pri oxidácii celulózy ako aj syntetických polymérov. V zmysle Russelovej schémy je to v prvom rade štatisticky prebiehajúca oxidácia primárnych a sekundárnych uhlíkov základného polymérneho reťazca, pri ktorej vznikajú sekundárne peroxylové radikály. Pri ich rekombinácii sa pozoruje slabá svetelná emisia. Táto reakcia je výrazne pomalšia ako oxidácia koncových skupín, ktoré sú v polyméri alebo prítomné alebo vznikajú predchádzajúcim štiepením polyméru.

U polysacharidov sa nám podarilo vysvetliť, ako mechanizmus oxidácie polysacharidov funguje za a bez prítomnosti vody. Pri oxidácii C6 uhlíka primárnej alkoholickej skupiny, ktorá prebieha radikálovym mechanizmom, vznikne karboxylová skupina, ktorá za prítomnosti vody poskytne vodíkové ióny potrebné pre hydrolytickú degradáciu, ktorej sa aj sama aktívne zúčastňuje. Hydrolytická degradácia pritom dáva koncové aldehydické skupiny, ktoré sa ľahko oxidujú radikálovym mechanizmom už pri izbovej teplote.

Keď oxidáciou základného reťazca polyméru vznikne hydroxylová, karbonylová, karboxylová alebo karbamidová skupina, ďalší priebeh oxidácie prebieha ľalšie.

Nakoľko polymérne hydroperoxidy, ktoré majú v β-polohe k hydroperoxidickej skupine niektorú z uvedených skupín sú podstatne menej stabilné ako izolované hydroperoxidy, z celkovej koncentrácie titračne stanovených hydroperoxidov predstavujú ale len určitý zlomok, pričom prispievajú k pozorovanej chemiluminiscencii podstatne viac ako izolované hydroperoxidy.

2. Vedecké projekty, ktoré boli roku 2006 financované APVT (APVV)

1. Názov projektu:

Analýza minoritných zložiek v komplexných polymérových systémoch.
(Analysis of minor components in complex polymer systems.)

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Berek Dušan**
Dátum začiatku/ukončenia riešenia projektu: **01.2005– 12.2007**
Evidenčné číslo projektu: **APVT-51-013204**
Finančný príspevok: **466 000.-Sk**
Spoluriešiteľské inštitúcie: **Univerzita A.Dubčeka, Trenčín a Ústav informatiky SAV**
Dosiahnuté výsledky:

Blokové kopolyméry našli široké použitie v technológiách v každodennom živote. Ich prípravu a vlastnosti študujú početné výskumné skupiny na celom svete. Pri syntéze blokových kopolymérov často vznikajú aj vzájomne neprepojené „rodičovské“ homopolyméry. Ich spoľahlivé vzájomné oddelenie ako aj ich oddelenie od blokového kopolyméru dosiaľ nebolo možné. Z toho dôvodu ani nebola možná presná molekulová chrakterizácia blokových kopolymérov. Vypracovali sme originálnu metódu kvantitatívnej separácie oboch materských homopolymérov od zodpovedajúcich diblokových kopolymérov v jedinom kroku. Metóda využíva nami skôr vypracovaný princíp kvapalinovej chromatografie pri limitných podmienkach entalpických interakcií (LC LC) s tým, že sa na separáciu uvedeného trojzložkového systému využijú dve kvapalné bariéry. Jedna selektívne zadrží interaktívny homopolymér ale prepustí kopolymér. Druhá zadrží kopolymér. Druhý homopolymér sa vymyje z LC LC kolóny nezadržaný, v exklúznom móduse. Metóda sa úspešne testovala na sérii komerčných i laboratórnych vzoriek blokových kopolymérov PS-b-PMMA, PS-b-PEO a PPO-b-PEO. Separácia je rýchla (menej ako 3 min.), látková kapacita je vysoká (nástrek až 1% roztoku) a výťažnosť vzoriek je 100%-ný. Očakáva sa pomerne široké použitie metódy na pracoviskách, ktoré syntetizujú blokové kopolyméry, prípadne ktoré študujú možnosti ich aplikácií.

Publikácie 2007:

1. REIJENGA, J. C. – KINGMA, W. J. – BEREK, Dušan – HUTTA, M.
   GPCSIM – an instrument simulator of polymer analysis by size exclusion chromatography for demonstration and training purposes. In *Acta Chimica Slovenica*. Vol. 54, (2007), pp. 79-87. (0.703 - IF_{2006})

2. RUSS, A. – BEREK, Dušan
   Enthalpy assisted size exclusion chromatography. Part 2. Adsorption retention mechnism. In *Journal of Separation Science*. Vol. 30, (2007), pp. 1852–1859. (2.535 - IF_{2006})

3. SHUNDO, A. - FUKUI, M. – TAKAFUJI, M. – AKASAKA, K. – OHRUI, H. – BEREK, Dušan – IHARA, H.
   Selectivity enhancement for *trans*-2-(2,3-Anthracenedicarboximido)cyclohexane-derived diastereomers in HPLC by using an ordered organic stationary phase. In *Analytical Sciences*. Vol. 23, (2007), pp. 1-5. (1.589 - IF_{2006})

4. ŠAUŠA, O. – KRIŠTIAK, J. – BEREK, Dušan – ISKROVÁ, M.
   Column packings for high-performance liquid chromatography and positron annihilation lifetime spectroscopy. In *Radiation Physics and Chemistry*. Vol. 76, (2007), pp. 271 – 274. (0.868 - IF_{2006})

5. YILDIZ, U. - CAPEK, Ignác - BEREK, Dušan - SAROV, Y. - RANGELOW, I.W.
   Inverse microemulsion copolymerization of butyl acrylate and acrylamide: kinetics, colloidal parameters and some model applications. In *Polymer International*. Vol. 56, (2007), p. 364-370. (1.475 - IF_{2006})

2. Názov projektu:

Nanokompozitné hybridné disperzie (materiály): Príprava a kolektívne vlastnosti.
(Nanokomposite hybrid dispersions (materials): Preparation and collective properties.)

Zodpovedný riešiteľ za Ústav polymérov: **Capek Ignác**
Dátum začiatku/ukončenia riešenia projektu: **03.2005 – 03.2008**
Evidenčné číslo projektu: **APVT– 20–017304**
Finančný príspevok: **700 000.-Sk**
Spoluriešiteľské inštitúcie: **Fakulta priemyselných technológii, Púchov - koordinátor**
Dosiahnuté výsledky:

Pokračovali sme v sumarizovaní a diskutovaní prípravy nanokompozitných častíc a disperzií. Pripravili sme Fe_2O_3, Fe_3O_4, $CoFe_2O_4$ a Co nanočastice s rozmermi 8-20 nm reakciou prebiehajúcou v roztoku pri vysokých teplotách (homogénnou a heterogénnou nukleáciou). Pripravené nanočastice sme charakterizovali UV-VIS spektroskopiou, transmisnou elektrónovou mikroskopiou a rozpustnosťou v nepolárnych rozpúšťadlách.
Sledovali sme tiež kinetiku a mechanizmus priamej a inverznej emulznej polymerizácie hydrofilného (akrylamid) a hydrofóbneho monoméru (styrén, butylakrylát, metyl metakrylát) v prítomnosti a v neprítomnosti prísad.

Publikácie 2007:

1. CAPEK, Ignác
   Iron oxide nanoparticle dispersions. In TADROS, T. F. Ed. *Colloid Stability and Application in Pharmacy***.** Wiley, 2007, chapter 1, pp. 1-55.

2. YILDIZ, U. - CAPEK, Ignác - BEREK, Dušan - SAROV, Y. - RANGELOW, I.W.
   Inverse microemulsion copolymerization of butyl acrylate and acrylamide: kinetics, colloidal parameters and some model applications. In *Polymer International*. Vol. 56, (2007), p. 364-370. (1.475 - IF_{2006})

3. *Názov projektu:*

Mapovanie proteínov Coxiella burnetti proteomickými technikami. Vývoj proteínových mikročipov pre rýchlu a citlivú diagnostiku Q horúčky.
(Mapping of the Coxiella burnetii proteins by proteomic techniques. Development of a protein microchip assay for a rapid and sensitive diagnosis of Q fever)

Zodpovedný riešiteľ za Ústav polymérov: **Capek Ignác**
Dátum začiatku/ukončenia riešenia projektu: **03.2005 – 03.2008**
Evidenčné číslo projektu: **APVT–51–032804**
Finančný príspevok: **bez príspevku**
Spoluriešiteľské inštitúcie: **Virologický ústav SAV – koordinátor** (Dr. Toman R., DrSc.)
Dosiahnuté výsledky:

Pokračovali sme v príprave nanokompozitných častíc a magnetických kvapalín inverznou mikroemulziou na interakciu s biopolymérmi a biologickými prípravkami. K tomuto účelu kontinuálne pripravujeme kompozitné častice železa a striebra.

4. Názov projektu:

Hybridné spintronické nanoštruktúry riadené spinovopolarizačným prúdom.
(Hybrid spintronic nanostructures controlled by spin-polarized current)

Zodpovedný riešiteľ za Ústav polymérov: **Capek Ignác**
Dátum začiatku/ukončenia riešenia projektu: **01.2007 – 12.2009**
Evidenčné číslo projektu: **APVV–0173-06**
Finančný príspevok: **178 000.-Sk**
Spoluriešiteľské inštitúcie: **Fyzikálny ústav SAV – koordinátor** (RNDr. Májková Eva, DrSc.)
Dosiahnuté výsledky:

Pokračovali sme v príprave samousporiadavajúcich sa magnetických nanočastíc a kvapalín redukciou prekurzorov kovov pri vysokých teplotách. Sledovali sme vplyv reakčných podmienok a typu prokurzorov na veľkosť častíc a stabilitu disperzie a ich usporiadavanie sa do dvoj- a trojrozmerných usporiadaní.

Publikácie 2007:

1. WEIS, M. – GMUCOVÁ, K. – NÁDAŽDY, V. – CAPEK, Ignác – ŠATKA, A. – KOPÁNI, M. – CIRÁK, J. – MAJKOVÁ, E.
Quantized double-layer charging of iron oxide nanoparticles on a-Si:H controlled by charged defects in a-Si:H. In *Electroanalysis*. Vol. 19, (2007), pp. 1323 – 1326. (2.444 - IF_{2006})

5. Názov projektu

Anizotropný prenos energie v hybridných nanomateriáloch vrstevnatých kremičitanov s organickými farbivami.
(Anisotropical energy transfer in hybrid nanomaterials based on layered silicates with organic dyes.)

Zodpovedný riešiteľ za Ústav polymérov: **Danko Martin**
Dátum začiatku/ukončenia riešenia projektu: **05.2006 – 04. 2009**
Evidenčné číslo projektu: **APVV-51-027405**
Finančný príspevok: **112 000.-Sk**
Spoluriešiteľské inštitúcie: **Ústav anorganickej chémie SAV, Bratislava – koordinátor**
Dosiahnuté výsledky:

Rozpracovala sa syntéza viacfunkčných značiek s chromofórmi s excitovaným stavom typu ICT. Spektrálne sa charakterizovali chalkóny s elektróndonornými a elektrónakceptornými substituentami. Zmerali sa absorpčné a emisné spektrá v roztoku a v polymérnej matrici. Tieto značky sa testovali ako značky na charakteristiku vrstevnatých kremičitanov. Optimalizovali sa podmienky a hľadali sa experimetálne postupy na spektrálne meranie v tuhej fáze – prášku. Rozpracované postupy prípravy polymérnych filmov dopovaných montmorilinitom a značkou zatiaľ neposkytli filmy dostatočnej optickej kvality.

6. Názov projektu:

Porovnanie rôznych spôsobov iniciácie sieťovania pre modelovanie nových procesov modifikácie termoplastov.
(Comparison of variouos ways of crosslining initiation for modelling new processes of thermoplastics modification.)

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Chodák Ivan**
Dátum začiatku/ukončenia riešenia projektu: **05.2006 – 04.2009**
Evidenčné číslo projektu: **APVV-51-010405**
Finančný príspevok: **2 050 000.-Sk** (APVV, Mýtna 23, 81107 BA, IČO: 36 069 493)
Spoluriešiteľské inštitúcie: **VUSAPL Nitra**
Dosiahnuté výsledky:

Rozbehli sa pomerne rozsiahle práce na porovnávaní vlastností materiálov s polymérovou matricou zosietených cestou iniciácie sieťovania rôznymi spôsobmi. Pracovalo sa predovšetkým s polyetylénom a polykaprolaktónom, ktoré boli plnené drevnými časticami (drevné piliny), ďalej zmesi biodegradovateľných plastov polykaprolaktón a polyhydroxybutyrát, pričom pozornosť sa venovala vplyvu zosietenia na vlastnosti polyamidu 6 plneného skleným vláknom. Z čiastkových výsledkov možno spomenúť detailné prepracovanie metódy stanovenia zosieteného podielu u polyamidu, rozpracovanie metodiky ožiarenia polymérnych materiálov lúčom neutrónov (originálny, zatiaľ v literatúre nepopísaný postup) a vyvinutie metódy kompatibilizácie zmesí biodegradovateľných plastov in situ zosietením.

7. Názov projektu:

Nanoštrukturálna modifikácia povrchu vlákenných a textilných materiálov.
(Nanostructural modification of surface of fibrous and fabric materials.)

Zodpovedný riešiteľ za Ústav polymérov: **Chodák Ivan**
Dátum začiatku/ukončenia riešenia projektu: **01.2005 – 12.2007**
Evidenčné číslo projektu: **APVT-99-035004**
Finančný príspevok: **800 000.-Sk** (APVV, Mýtna 23, 81107 BA, IČO: 36 069 493)
Spoluriešiteľské inštitúcie: **VUTCh Žilina – koordinátor, FChPT STU, MFF UK**
Dosiahnuté výsledky:

Polyamidové textílie (PA) sa modifikovali vodivým polymérom chemickou oxidačnou polymerizáciou pyrolu (Py) v statických podmienkach, použitím chloridu železitého ako oxidačného činidla. Na zvýšenie odolnosti polypyrolovej vrstvy na povrchu vlákien proti oderu sa použil pyrolom funkcionalizovaný silán 1-(3-(trietoxysilyl)propylamino)-3-(1H-pyrol-1-yl) propan-2-ol (SiP). Uskutočnené modifikácie môžeme rozdeliť do troch skupín:

(i) základná modifikácia – prvotná aplikácia vodného roztoku monoméru a následný prídavok oxidačného činidla,
(ii) modifikácia v prítomnosti iónových tenzidov (aniónových – kyseliny dodecylbenzylsulfónovej- DBSA a katiónových – cetyltrimetylamónium bromidu - CTMAB),
(iii) modifikácia sól-gél procesom pyrolsilánu.

Množstvo naviazaného vodivého polyméru sa stanovilo elementárnou analýzou a zloženie povrchovej vrstvy pomocou röntgenovej fotoelektrónovej spektroskopie (XPS). Študovali sa predovšetkým elektrické vlastnosti pripravených textilií. Odolnosť polypyrolovej vrstvy, respektíve pevnosť ukotvenia polypyrolu na povrchu polyamidovej textílie sa skúmala po aplikácii piatich cyklov vypierania. Vodivosť modifikovaného materiálu sa merala pred aj po vypraní. Z výsledkov elektrickej vodivosti vyplýva, že najmenší pokles elektrickej vodivosti po aplikovaní prania dosahovali textílie, ktoré boli predupravené prostredníctvom sól-gél procesu pyrolsilánom. Ich vodivosť bola porovnateľná s textíliami pripravenými iba v prítomnosti monoméru a oxidačného činidla, avšak vodivosť týchto vzoriek po procese prania klesla o niekoľko rádov v dôsledku nekovalentných interakcií medzi polypyrolom a povrchom textílie. Naviazanie SiP na povrch vlákien sa potvrdilo röntgenovou fotoelektrónovou spektroskopiou. Zvyšenie hmotnostného percenta SiP zabezpečilo lepšiu odolnosť vodivej vrstvy voči vypieraniu, pričom PA textília predupravená 1 hm. % SiP po následnej polymerizácii 25 hm. % roztoku pyrolu dosiahla povrchovú vodivosť $9{,}3\times10^{-4}$ S/štvorec. Pokles vodivosti po procese prania bol malý, vodivosť mala hodnotu $2{,}9\times10^{-4}$ S/štvorec. Povrchová elektrická vodivosť modifikovaných PA tkanín závisí všeobecne od hrúbky PPy vodivej vrstvy, od stupňa usporiadanosti PPy a aj od interakcií medzi jednotlivými vláknami. Hrubšia PPy vrstva zlepší interakcie medzi jednotlivými vláknami reprezentujúcimi elektrické kontakty, ako to ukázalo aj štúdium riadkovacej elektrónovej mikroskopie.

8. Názov projektu:

Organické modifikácie prírodných nanomateriálov.
(Organic modifications of natural nanomaterials.)

Zodpovedný riešiteľ za Ústav polymérov: **Chodák Ivan**
Dátum začiatku/ukončenia riešenia projektu: **05.2006 – 04.2009**
Evidenčné číslo projektu: **APVV-51-050505**
Finančný príspevok: **800 000.-Sk** (APVV, Mýtna 23, 81107 BA, IČO: 36 069 493)
Spoluriešiteľské inštitúcie: **Ústav anorganickej chémie SAV – koordinátor**
Dosiahnuté výsledky:

Pripravili sa rôzne modifikácie prírodných bentonitov zo slovenských zdrojov (dodávateľ Envigeo), ktoré sa následne testovali ako plnivá do rôznych polymérov. Pozornosť sa venovala predovšetkým elastomérom s cieľom modifikovať zmesi pre behúne pneumatík a biodegradovateľným plastom so zámerom pripraviť biodegradovateľné materiály s výrazne zvýšenými pevnostnými parametrami. Predbežné výsledky nasvedčujú skutočnosti, že pre každú matricu je vhodné hľadať optimálnu modifikáciu, napriek tomu, že vo všetkých prípadoch ide o hydrofóbne polyméry. Prepokladá sa, že dôležitým parametrom by mohol byť parameter rozpustnosti alebo aj voľná povrchová energia polyméru, ktorý tvorí matricu, pričom tieto údaje by mali korelovať s modifikátorom použitým pre povrchovú modifikáciu plniva.

9. Názov projektu:

Vysokopevné a termopojivé metalocenové polyolefínové vlákna.
(High-strength thermojoining metalocene polyolefin fibres.)

Zodpovedný riešiteľ za Ústav polymérov: **Chodák Ivan**
Dátum začiatku/ukončenia riešenia projektu: **05.2006 – 04.2009**
Evidenčné číslo projektu: **APVV-0226-06**
Finančný príspevok: **502 000.-Sk** (APVV, Mýtna 23, 81107 BA, IČO: 36 069 493)

Spoluriešiteľské inštitúcie: **VUChV Svit – koordinátor, FChPT STU-Ústav polymérnych materiálov**

Dosiahnuté výsledky:

Charaketrizovali sa všetky materiály, a to dva typy granulátov pripravené tradičnou metódou Ziegler-Nattovými katalyzátormi a päť granulátov pripravených technológiou s metalocénovým katalyzátorom od rozličných výrobcov. Granuláty sa líšili výrazne v údajoch indexu toku (ITT medzi 4 a 31) a do istej miery i v indexe polydisperzity (1.2 až 1.6). Na charakterizáciu sa použila metóda DMTA a reologické merania. Súčasne sa metóda DMTA použila i na charakterizáciu vlákien pripravených z rôznych granulátov pri rozličnej rýchlosti zvlákňovania a z týchto vlákien dĺžené vlákna s rôznym dĺžiacim pomerom. Takto je možné porovnať vplyv všetkých parametrov na charakteristiky DMTA pre rozličné materiály.

9. Názov projektu:

Znovu hroziace patogény-vibria. Štúdium virulencie a možnej aktívnej imunomodulačnej ochrany.

(Newly emerging phatogens-vibrios. Study of virulence and possible active immunomodulative prevention.)

Zodpovedný riešiteľ za Ústav polymérov: **Kronek Juraj**
Dátum začiatku/ukončenia riešenia projektu: **03.2007 – 12.2009**
Evidenčné číslo projektu: **APVV-003206**
Finančný príspevok: **500 000.-Sk**
Spoluriešiteľské inštitúcie: **Chemický ústav SAV – koordinátor** (Dr. Bystrický, S., DrSc.)
Dosiahnuté výsledky:

Pripravili sa nové monoméry obsahujúce 2-oxazolínový kruh a ďalšiu funkčnú skupinu, v našom prípade chránenú aminoskupinu (ako chrániaca skupina sa použila Boc) a metoxykarbonylovú skupiny (chránená karboxylová skupina). Príprava oboch monomérov vyžadovala niekoľkostupňový syntetický postup vyžadujúci dodržanie striktných bezvodých podmienok. Ďalej sa pripravili nové iniciátory katiónovej polymerizácie obsahujúce tosylátové skupiny. Ako východiskový sa použil polyvinylalkohol s mólovou hmotnosťou v rozmedzí 20000 g/mol a modifikáciou sa získal tosylovaný polymér s M_n = 50 000 g/mol a distribúciou mólovej hmotnosti v oblasti okolo 2. V ďalšom postupe sa popísaný makroiniciátor použije na prípravu hrebeňových polymérov s poly(2-oxazolínovými) ramenami.

10. Názov projektu:

Geneticky modifikované mikroorganizmy ako celobunkové katalyzátory enantioselektívnych biooxidácií pre nové imobilizované biotechnológie.

(Genetically engineered microorganisms as whole-cell catalysts of enantioselective biooxidations performing by novel immobilization biotechnologies.)

Zodpovedný riešiteľ za Ústav polymérov, zástupca vedúceho projektu: **Lacík Igor**
Dátum začiatku/ukončenia riešenia projektu: **04.2006 – 04.2009**
Evidenčné číslo projektu**: APVV-51-033205**
Finančný príspevok: **509 000.-Sk**
Spoluriešiteľské inštitúcie: **Chemický ústav SAV Bratislava - koordinátor, Medzinárodné laserové centrum Bratislava, Fakulta chemickej a potravinárskej technológie STU, TU Wien, Rakúsko**
Dosiahnuté výsledky:

Stanovili sa rozdiely vo vlastnostiach mikrokapsúl na báze alginátu sodného, sulfátu celulózy a poly(metylén-co-guanidínu) pripravených jedno- a dvojkrokovým postupom. Prvý

postup je preferovaný na našom pracovisku, pokiaľ čo druhý je využívaný na mnohých svetových pracoviskách. Najmä na základe CLSM výsledkov poskytujúcich koncentračné profily polymérov v mikrokapsuli bolo poukázané na to, že kapsule pripravené týmito postupmi sú rozdielne a že pri dvojkrokových kapsulách je nebezpečenstvo vysokej heterogenity v zložení pripravených mikrokapsúl.

Publikácie 2007:

1. VIKARTOVSKÁ, A. – BUČKO, M. – MISLOVIČOVÁ, D. – PÄTOPRSTÝ, V. – LACÍK, Igor – GEMEINER, P.
   Improvement of the stability of glucose oxidase *via* encapsulation in sodium alginate-cellulose sulfate-poly(methylene-*co*-guanidine) capsules. In *Enzyme and Microbial Technology*. Vol. 41, (2007), pp. 748–755. (1.897 - IF_{2006})

2. QI, M. − STRAND, B. L. − LACÍK, Igor − WANG, Y. − BARBARO, B. − GANGEMI, A. − SALEHI, P. − KUECHLE, J. − BENEDETTI, E. − HUNKELER, D. − SKJAK-BRAEK, G. − OBERHOLZER. J.
   Prolonged immunosuppression-free survival of TAM encapsulated human islet grafts in diabetic, immunocompetent mice. In *American Journal of Transplantation.* Vol. 295, Suppl. 2, (2007), p. 223 (6.843 - IF_{2006})

3. LACÍK, Igor − CHORVÁT, Dušan Jr.
   Visualisation techniques in the characterization of polymer microcapsules: CLSM and AFM. Submitted as book chapter for *The Bioartificial Endocrine Pancreas*, Ed. J.-P. Halle, Research Signpost, Trivandrum, India, odoslané

4. LACÍK, Igor
   Pomôžu polyméry diabetikom? *ChemZi.* Roč. 2, č. 2, (2007), pp. 54−55.

5. KOLLÁRIKOVÁ, Gabriela – LACÍK, Igor – ŠTRBÁK, V. – BAČOVÁ, Z. – HUNKELER, D .- OBERHOLZER, M. Q. J. – MICHALKA, P. – CHORVÁT, Dušan – PODSKOČOVÁ, J.
   Encapsulation of islets of Langerhans in polymeric microcapsules. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 119. Vývеska 3Po-Po40

11. Názov projektu:

Vodorozpustné polyméry: od fundamentálnych poznatkov o interakciách, štruktúre a dynamike v roztoku ku kontrole mechanizmu ich syntézy a samo-usporiadania.
(Water soluble polymers: from the fundamentals of interactions, structure and dynamics in solution to controlled polymer synthesis and self-assembly.)

Zodpovedný riešiteľ za Ústav polymérov, zástupca vedúceho projektu: **Lacík Igor**
Dátum začiatku/ukončenia riešenia projektu: **04.2006 – 04.2009**
Evidenčné číslo projektu: **APVV-51-037905**
Finančný príspevok: **695 000.-Sk**
Spoluriešiteľské inštitúcie: **Ústav experimentálnej fyziky SAV Košice - koordinátor, Medzinárodné laserové centrum Bratislava**

Dosiahnuté výsledky:

Sledovala sa polymerizácia kyseliny metakrylovej a stanovili sa rýchlostné konštanty propagácie k_p v závislosti od stupňa ionizácie, teploty a koncentrácie monoméru. Určili sa rýchlostné konštanty propagácie rôznych N−vinylamidov, ktoré dovoľujú pochopiť mechanizmus radikálovej polymerizácie týchto monomérov.

Publikácie 2007:

1. BEUERMANN, S. – BUBACK, M. – HESSE, P. – KUKUČKOVÁ, S. – LACÍK, Igor
Propagation kinetics of free-radical methacrylic acid polymerization in aqueous solution. The effect of concentration and degree of ionization. In *Macromolecular Symposia*. Vol. 248, (2007), pp. 23-32.

2. STACH, Marek – LACÍK, Igor – CHORVÁT, Dušan Jr – BUBACK, M. – HESSE, P. – HUTCHINSON, R.A. – TANG, L.
Propagation rate coefficient for radical polymerization of *N*-vinyl pyrrolidone in aqueous solution obtained by PLP−SEC. In *Macromolecules*, odoslané

3. UČŇOVÁ, Lucia – CHORVÁT, Dušan – LACÍK, Igor
Effect of couterion size on propagation rate for the aqueous phase polymerization of ionized methacrylic acid determined by PLC/SEC technigue. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 211. Výveska 3Po-Ut36

12. Názov projektu:

EPOS: Využitie očkovania polymérov pomocou elektropolymerizácie v imobilizácii proteínov na tuhé povrchy pre prípravu biosenzorov.
(Application of the electrografting polymerization for immobilization of proteins onto solid surfaces in design of the implantable glucose sensitive biosensor.)

APVV projekt vyvolaný IP 6RP EÚ P. Cezanne

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Lacík Igor**
Dátum začiatku/ukončenia riešenia projektu: **05.2007 – 12.2009**
Evidenčné číslo projektu: **RPEU-0007-06**
Finančný príspevok: **484 000.-Sk**
Spoluriešiteľské inštitúcie: **Ústav experimentálnej endokrinológie SAV, Medzinárodné laserové centrum Bratislava**

Dosiahnuté výsledky:

Bola zavedená metodika elektropolymerizačného očkovania, ktorá sa využíva pre pokrytie vodivých a polovodivých povrchov biokompatibilnými polymérmi. Pri použití vhodných polymérov a podmienok očkovania je možné minimalizovať nekontrolované obrastanie povrchov proteínmi a bunkami, tzv. biofouling. Naočkované metakrylátové a akrylátové polyméry sú následne modifikované za účelom získať zwitterionové polyméry s vysokým obsahom náboja, čím sa dosahuje ich vysoká hydratácia, ktorá je predpokladom pre zabránenie nešpecifického uchytenia proteínov s následnou nekontrolovanou imunitnou reakciou organizmu. Tento princíp bol potvrdený napr. ukotvením poly(sulfobetaín metakrylátu) na vodivý povrch (oceľ), na ktorý vďaka polymérovej vrstve neadherovali modelové bunky RAT-2 fibroblasts v *in vitro* experimentoch. Táto práca predstavuje jednu z aktivít cielenú na vývoj biokopatibilných povrchov na Ústave polymérov SAV.

Publikácie 2007:

1. KASÁK, Peter – KRONEKOVÁ, Zuzana – STACH, Marek – CHORVÁT, Dušan – LACÍK, Igor
Novel biocompatible zwitterionic materials. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 111. Výveska 3Po-Po27

2. STACH, Marek – KASÁK, Peter - LACÍK, Igor
Electrografting of polymers onto electroconductive substrate as a tool for formation of non-biofouling surfaces for biomedical applications. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 118. Výveska 3Po-Po39

13. Názov projektu:

Nové aromatické nitroxidy a alkoxyamíny. Syntéza, charakterizácia a využitie pri LFRP a stabilizácii polyolefínov.
(New aromatic nitroxides and alkoxyamines. Synthesis, characterization and utilization for LFRP and stabilization of polyolefins.)

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Mosnáček Jaroslav**
Dátum začiatku/ukončenia riešenia projektu: **01.2005 – 12.2007**
Evidenčné číslo projektu: **APVT-51-004904**
Finančný príspevok: **592 000.-Sk**
Spoluriešiteľské inštitúcie: **Katedra organickej chémie Prírodovedeckej fakulty UK, Mlynská dolina, Bratislava**

Dosiahnuté výsledky:

Pripravili sa deriváty na báze pyrolu substituované v polohách 2,5-metylom a fenylom a v polohách 3,4-karboxyetylom tak, aby v aromatickom kruhu neboli voľné vodíkové atómy. Výťažky niekoľkostupňových syntéz boli do 10%. Tieto deriváty po oxidácii kyslíkom v prítomnosti PbO_2 vykazujú na EPR spektrách typický radikálový signál vedľa dusíka. Práve voľné vodíky v aromatickom kruhu spôsobujú, že takýto systém je málo stabilný. Vzniknutý radikál je delokalizovaný na celý kruh a môže dochádzať k odštepovaniu vodíka. Pri radikálovej polymerizácií styrénu (125°C) v prítomnosti týchto derivátov sa podľa GPC neprejavil kontrolovaný charakter polymerizácie. Bol pripravený nitroxidový derivát aromatického amínu s hydroxylovou skupinou v β-polohe vedľa dusíkového atómu. Aj tento derivát vykazoval typický paramagnetický signál v EPR spektrách pre radikál štiepený dusíkovým jadrom. Oxidáciou derivátu v toluéne sa signál rozširoval a strácal vibračnú štruktúru.

Publikácie a prezentácie 2007:

1. KÓSA, Csaba – MOSNÁČEK, Jaroslav – BÍLEŠOVÁ, A. – KASÁK, Peter – KRONEK, Juraj – DANKO, Martin – KOLLÁR, Jozef
   Synthesis, oxidation and photophysical properties of novel derivatives of acyclic aromatic amines. In *Collection of Czechoslovak Chemical Communications*. Vol. 72, no. 9, (2007), pp.1255-1268. (0.881 - IF_{2006})

2. MOSNÁČEK, Jaroslav – BERTOLDO, M. – KÓSA, Csaba – CAPPELLI, Ch. – RUGGERI, G. – LUKÁČ, Ivan – CIARDELLI, F.
   Modification and photostabilization of low density polyethylene film by photodecomposition of various diazo-compounds and methyl azidocarboxylate. In *Polymer Degradation and Stability*. Vol. 92, (2007), pp. 849–858. (2.174- IF_{2006})

3. DANKO, Martin – LIBISZOWSKI, J. - WOLSZCZAK, M. - RAČKO, Dušan – DUDA, A.
   Fluorescence study of the molecular dynamics of star-shaped poly(ε-caprolactone)s in tetrahydrofuran as solvent. In *Programme and Book of Abstracts of European Polymer Congress 2007, July 1-5, 2007, Portorož, Slovenia.* p. 199. 2 pages on CD ROM. Výveska P 1.4.90

4. MOSNÁČEK, Jaroslav – KOLLÁR, Jozef – KRONEK, Juraj – RAČKO, Dušan – KÓSA, Csaba, DANKO, Martin – BÍLEŠOVÁ, A.
   Aromatic initiators for nitroxide madiated LFRP, synthesis and molecular modeling. In *Programme and Book of Abstracts of European Polymer Congress 2007, July 1-5, 2007, Portorož, Slovenia.* p. 198. 2 pages on CD ROM.Výveska P 1.4.83.

14. Názov projektu:

Nové druhy adhezív pre nábytkársky priemysel.
(New types of the adhesives for the industry of furniture)

Zodpovedný riešiteľ za Ústav polymérov: **Pollák Vladimír**
Dátum začiatku/ukončenia riešenia projektu: **08.2005 – 10.2007**
Evidenčné číslo projektu: **APVT-99-503405**
Finančný príspevok: **75 000.-Sk** (APVV, Mýtna 23, 81107 BA, IČO: 36 069 493)
Spoluriešiteľské inštitúcie: **VIPO a.s., Partizánske - koordinátor**

Dosiahnuté výsledky:

Riešenie čiastkových úloh projektu (a: Nové druhy disperzných polyuretánových lepidiel pre 3-D povrchovú úpravu drevovláknitých dosiek termoplastickými fóliami na báze PVC so zvýšenou tepelnou odolnosťou; b: Výskum a vývoj taveninových lepidiel pre oplášťovanie drevovláknitých dosiek papierovo-živičnými fóliami) bolo zamerané na štúdium rozpadu komplexu toluéndiizokyanátu (TDI) s amínmi, blokujúcimi reaktívne -N=C=O skupiny vo vodnom systéme a použitie tohto systému na vytvrdzovanie vybraných polyuretánov (PUR). Cieľom bolo odhadnúť teplotu a čas vytvrdzovacej reakcie PUR s komplexom TDI pri použití dvoch rôznych blokujúcich amínov. Bolo zistené, že pri teplotách a časoch vyžadovaných z priemyselnej praxe bude pri vytvrdzovaní potrebné využitie vhodných akcelerátorov.

15. Názov projektu:

Výskum a vývoj sofistikovaných systémov s aplikáciou biopolymérov vo farmácii, liečebnej kozmetike a v oblasti adhezív.
(Research and development of the sophisticated systems with the application of the biopolymers in the pharmaceutical, cosmetics and adhesive production.)

Zodpovedný riešiteľ za Ústav polymérov: **Pollák Vladimír**
Dátum začiatku/ukončenia riešenia projektu: **08.2005 – 10.2007**
Evidenčné číslo projektu: **APVV-99-503305**
Finančný príspevok: **20 000.-Sk** (APVV, Mýtna 23, 81107 BA, IČO: 36 069 493)
Spoluriešiteľské inštitúcie: **VIPO a.s., Partizánske - koordinátor**
Dosiahnuté výsledky:

Riešenie projektu bolo zamerané na štúdium modifikácie polyuretánových (PUR) lepidiel vybranými typmi kolagénov (KO1 a KO2). Bola sledovaná stabilita zmesí PUR s KO s prídavkom bentonitu a triacetínu. Boli študované mechanické vlastnosti získaných vzoriek po zosietení komplexom toluéndiizokyanátu s vhodným blokujúcim amínom. Použitím vhodnej koncentrácie bentonitu a triacetínu bola získaná relatívne stabilná zmes PUR s KO. Mechanické vlastnosti získaného kompozitu po zosietení TDI vykazovali stúpajúcu pevnosť s obsahom kolagénu KO2.

3. Účasť na nových výzvach APVV r. 2007

1. Názov projektu:

Nekonvenčné postupy separácie a molekulovej charakterizácie zložiek komplexných polymérových systémov.
(Unconventional methods of separation and molecular characterization of components of complex polymer systems.)

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu:: **Berek Dušan**
Číslo projektu: **APVV-0592-07**
Spolupracujúce inštitúcie: **Ústav informatiky SAV**

2. Názov projektu:

Pohyblivosť proteínov a katalýza.
(Protein motion and catalysis)

Zodpovedný riešiteľ za Ústav polymérov: **Bleha Tomáš**
Číslo projektu: **APVV-0607-07**
Spolupracujúce inštitúcie: **Chemický ústav SAV – koordinátor** (Ing. Tvaroška Igor, DrSc.)

3. Názov projektu:

Biologické polyméry v nanokanáloch, dutinách a agregátoch.
(Biological polymers in nanochannels, cavities and aggregates.)
Pre APVV výzvu zameranú na vytvorenie postdoktorandských miest

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Bleha Tomáš**
Číslo projektu: **LPP-0187-07**
Spolupracujúce inštitúcie: ***---***

4. Názov projektu:

Konjugáty nanokompozitných častíc: Príprava a kolektívne vlastnosti.
(Nanocomposite particle conjugates:Preparation and collective properties.)

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Capek Ignác**
Číslo projektu: **APVV-0377-07**
Spolupracujúce inštitúcie: **Fyzikálny ústav, Virologický ústav, Chemický ústav SAV, Fakulta matematiky, fyziky a informatiky UK**

5. Názov projektu:

Nanoštruktúry pre aplikácie v biosenzoroch.
(Nanomaterials for applications in biosensors)

Zodpovedný riešiteľ za Ústav polymérov: **Capek Ignác**
Číslo projektu: **APVV-newproject-5527**
Spolupracujúce inštitúcie: **Katedra matematiky, fyziky a informatiky, UK Bratislava - koordinátor** (Prof. Hianik, DrSc.)

6. Názov projektu:

Kvantifikácia priestorového obmedzenia makromolekúl v polymérnych materiáloch a procesoch.
(Assesment of role of confinement in polymer materials and processes.)

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Cifra Peter**
Číslo projektu: **APVV-0079-07**
Spolupracujúce inštitúcie: ***---***

7. Názov projektu:

Centrum pokročilej výpočtovej chémie a molekulových vied.
(Centre for advanced computational chemistry and molecular science.)
APVV Projekt pre Centrum excelentnosti, Akronym projektu - COMCHEMOL

Zodpovedný riešiteľ za Ústav polymérov: **Cifra Peter**
Číslo projektu: **VVCE-0012-07**
Spolupracujúce inštitúcie: **Prírodovedecká fakulta UK – koordinátor, chemické ústavy SAV, FCHPT, FMFI UK**

8. Názov projektu:

Fluorescenčne značené polyméry s presne definovanou architektúrou ako nástroje pre molekulovú charakterizáciu technikami HPLC.
(Fluorescently labeled polymers with well-deffined architecture as tools for molecular characterization by HPLC techniques.)

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Danko Martin**
Číslo projektu: **APVV-0593-07**
Spolupracujúce inštitúcie: **-**

9. Názov projektu:

Cielená fotodynamická terapia rakoviny: od transportu liečiva cez bunkové signálne cesty po in vivo model.
(Targeted photodynamic therapy of cancer: from delivery system through cellular signaling to in vivo model.)

Zodpovední riešitelia za Ústav polymérov: **Kasák Peter, Lacík Igor**
Číslo projektu: **APVV−0449−07**
Spolupracujúce inštitúcie: **UPJŠ Košice – koordinátor (**Prof. P. Miškovský)

10. Názov projektu:

Nové hybridné materiály na báze syntetických polymérov a biopolymérov pre využitie v biotechnológiách.
(Advanced materials based on conjugates of polymers and biopolymers for biotechnology.)

Zodpovedný riešiteľ za Ústav polymérov, koordinátor projektu: **Kronek Juraj**
Číslo projektu: **VVCE-0065-07/podaný 12.07**
Spolupracujúce inštitúcie: **Chemický ústav SAV, Zdravotnícka univerzita**

Program: **Podpora vzniku a činnosti výskumných a vzdelavacích centier excelentnosti – VVCE 2007**

11. Názov projektu:

Uhlíkové nanokompozity pre chemické senzory.
(Carbon nanocomposites for chemical sensing.)

Zodpovedný riešiteľ za Ústav polymérov: **Krupa Igor**
Číslo projektu **APVV-0478-07**
Spolupracujúce inštitúcie: **Elektrotechnický ústav SAV - koordinátor**

12. Názov projektu:

Výskum a vzdelávanie pre drevospracujúci priemysel.
(Research and education for wood processing industry.)
APVV Projekt pre Centrum excelentnosti, **Akronym - REWOPI**

Zodpovedný riešiteľ za Ústav polymérov: **Novák Igor**
Číslo projektu: **VVCE-NEWPROJECT-7053**
Spolupracujúce inštitúcie: **TU Zvolen - koordinátor**

13. Názov projektu:

Príprava, vlastnosti a senzorické aplikácie polymérnych nanokompozitov na báze funkcionalizovaných uhlíkových nanotrubičiek
(Preparation, properties and sensoric applications of polymeric nanocomposites on the base of functionalized carbon nanotubes.)

Zodpovedný riešiteľ za Ústav polymérov: **Omastová Mária**
Číslo projektu: **APVV-0268-07**
Spolupracujúce inštitúcie: **Elektrotechnický ústav SAV**

4. Projekty riešené v rámci ŠPVV a ŠO

1. Názov projektu:

Záchrana, stabilizácia a konzervovanie tradičných nosičov informácií v Slovenskej republike.
(Preservation, stabilization and conservation of traditional carriers of information in Slovak Republic.)

Zodpovedný riešiteľ za Ústav polymérov: **Rychlý Jozef**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2008**
Evidenčné číslo projektu: **Kniha SK ŠPVV 2003SP200280301**
Finančný príspevok: **500 000.-Sk**
Spoluriešiteľské inštitúcie: **FCHPT STU, Bratislava; Slovenský národný archív, Bratislava; Slovenská národná knižnica, Martin**

Dosiahnuté výsledky:

Pokračovalo sa vo využívaní chemiluminiscenčnej metódy a existencie korelácie medzi výpovednými údajmi tejto metodiky (rýchlostné konštanty pri definovanej teplote, zvyšková

životnosť papiera pri podmienkach testu, prípadne pokles relatívneho polymerizačného stupňa) so skúškami mechanickej pevnosti sledovaných vzoriek pomocou dvojohybov alebo zmenami priemerného polymerizačného stupňa celulózy stanovenými pomocou viskozimetrie.

Zistilo sa, že pH extraktu zo Slavošovského papiera, ktorý sa v uvedenom projekte stal referenčnou vzorkou sa počas vlhkého starnutia (80^{o}C, relatívna vlhkosť 60%, 36 dní) mení v rozmedzí 0.1 jednotky a v rozmedzí 0.3 jednotiek v prípade suchého starnutia (105^{o}C, 36 dní). Pri svetlom indukovanom starnutí sa pH papiera mení zo 4.7 na 3.3 už po 8 dňoch. Pokles v počte dvojohybov je najvýznamnejší v prípade suchého starnutia, pričom je porovnateľný so svetlom indukovaným starnutím. Zvyšujúca sa kyslosť starnutého papiera je tak zrejme spôsobená nižšie mólovými kyslými produktami degradácie, ktoré sa v dôsledku zvýšenej teploty pri vlhkom a suchom starnutí zo systému odparujú. Rýchlostná konštanta oxidácie papiera pri 105^{o}C narastá počas svetlom indukovaného starnutia až na trojnásobok pôvodnej hodnoty, pri vlhkom a suchom starnutí dochádza alebo k poklesu alebo k priechodu jej hodnoty cez maximum. Zdá sa preto, že oxidačný atak sa sústreďuje na nižšie mólové kyslé produkty oxidácie.

5. Projekty centier excelentnosti SAV

1. Názov projektu:

Centrum pokročilej výpočtovej chémie (COMCHEM).
(Centre for advanced computational chemistry.)

Zodpovedný riešiteľ za Ústav polymérov: **Cifra Peter**
Dátum začiatku/ukončenia riešenia projektu: **01.2007 - 12.2010**
Evidenčné číslo projektu: ---
***Spoluriešiteľské inštitúcie*: Ústav anorganickej chémie SAV - koordinátor, Chemický ústav SAV,FCHPT, PrF UK a FMFI UK**
Finančné zabezpečenie: **250 000.-Sk**
Dosiahnuté výsledky:

Sledovali sme správanie sa relatívne tuhých makromolekúl v obmedzenom priestore mikro- a nano-kanálov či sférických dutín, reprezentujúcich mnohé situácie dôležité v biologických procesoch. Kanály a štrbiny sa v súčasnosti využívajú na pozorovanie vlastností jednotlivých biomakromolekúl ako aj na ich manipuláciu a separáciu v mikrofluidných zariadeniach vytvorených fotolitografiou na čipoch. Pomocou hrubozrnných (mezoškálových) molekulových simulácií sa metódou Monte Carlo skúmali reťazce s perzistenčnými dĺžkami charakteristickými pre makromolekuly ako sú DNA alebo aktín.

Pri skúmaní orientovania makromolekúl v kanáloch sme sa venovali prechodu medzi režimami od slabšieho obmedzovania ku silnému obmedzovaniu. Tento prechod bol nájdený v oblasti ležiacej blízko k súčasným teoretickým predpovediam. Sledovanie štruktúrneho faktoru v štrbine a v kanáli ukázalo tri charakteristické režimy v súlade s predpoveďou škálovacej teórie. Ďalej sa zo simulácií stanovili podmienky pre výskyt štruktúry makromolekúl vo forme tzv. vlasovej sponky ako výsledok rovnováhy obmedzovania a tuhosti reťazca. V prípade silných obmedzení tuhých reťazcov v sférickej dutine ich štruktúra pripomína usporiadanie do cievky, ktorá sa navíja od vnútornej steny dutiny do stredu, pričom stred zostáva často voľný. Podobné štruktúry sa uplatňujú pri genomických makromolekulách v schránkach bakteriofágov.

Vlastná perzistenčná dĺžka makromolekúl sa sledovala štyrmi metódami, ktoré v prípade voľného reťazca poskytovali identické hodnoty. V prípade geometrického obmedzenia reťazcov len rigorózna a tzv. WLC metóda poskytla priebeh zdanlivej perzistenčnej dĺžky so zvyšujúcim sa obmedzovaním kvalitatívne správne. Ukázalo sa, že experimentálne často používaná funkcia predpokladajúca exponenciálny zánik orientačných korelácií v reťazci poskytuje správnu hodnotu len v oblasti krátkych vzdialeností pozdĺž reťazca.

Publikácie a prezentácie 2007:

1. CIFRA, Peter - BENKOVÁ, Zuzana - BLEHA, Tomáš
   Persistence lengths and structure factors of wormlike polymers under confinement. *Journal of Physical Chemistry B*, v tlači

2. CIFRA, Peter - BENKOVÁ, Zuzana - BLEHA, Tomáš
   Effect of confinement on properties of stiff biological macromolecules. *Faraday Discussion 139 – The Importance of Polymer Science for Biological Systems,* v tlači

6. Vedecko-technické projekty, ktoré boli v roku 2007 financované

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7. Projekty podporované Európskym sociálnym fondom

1. Názov projektu:

Posilnenie úlohy doktorandov pri príprave vedeckých projektov.
(Strengthenning of the role of doctorands at the preparation of scientific project.)

Zodpovední riešitelia za Ústav polymérov, koordinátori projektu: **Hloušková Zuzana, Rychlý Jozef**
Dátum začiatku/ukončenia riešenia projektu: **04.2007 – 12.2007**
***Evidenčné číslo projektu*:** **projekt podporovaný zo sociálneho fondu EU**
Finančný príspevok: **4 687 077.-Sk**
***Spoluriešiteľské inštitúcie*: Eupolis, Bratislava. Ergotech Torino, Taliansko**
Dosiahnuté výsledky:

Úlohou projektu bolo vyškoliť osem doktorandov z Ústavu polymérov pre písanie a prípravu vedeckých projektov. Z množiny projektov bolo vybraných osem, na ktorých skupina doktorandov pomocou expertov z Ústavu polymérov, Eupolisu a Ergotechu a pomocou e-learningu pripravila podklady pre ich umiestnenie na rozličné výzvy (EU, APVV, VEGA).

2. Názov projektu:

Vybudovanie výskumno-vývojovej a inovačnej siete pre oblasť materiálov a technológií ich spájania (MATNET).
(Creation of development and inovation network of materials and technologies for joining.)

Zodpovedný riešiteľ za Ústav polymérov: **Chodák Ivan**
Riešitelia čiastkových úloh za Ústav polymérov: **Pollák Vladimír, Novák Igor**
Dátum začiatku/ukončenia riešenia projektu: **04.2006 – 03.2008**
Evidenčné číslo projektu: **ESF (č. JPD 3 2005/1-018, kód projektu 13120200076)**
Finančný príspevok: **90 010.-Sk, Európsky sociálny fond**
***Spoluriešiteľské inštitúcie*: Ústav materiálov a mechaniky strojov SAV – koordinátor; Elektrotechnický ústav SAV, Fyzikálny ústav SAV, Ústav anorganickej chémie SAV, Strojnícka fakulta STU Bratislava - Katedra materiálov a technológií, Fakulta elektrotechniky**

a informatiky STU Bratislava - Katedra elektrotechnológie, Prvá zváračská, a.s. Bratislava, Medzinárodné laserové centrum Bratislava

Dosiahnuté výsledky:

Cieľom riešenia projektu je vytvoriť výskumno-vývojovú a inovačnú sieť MATNET združujúcu inštitúcie zamerané na výskum a vývoj v oblasti progresívnych materiálov a technológií. V rámci riešenia projektu boli v uplynulom období pripravované informačné materiály pre publikovanie na web stránke www.matnet.sav.sk z oblasti polymérnych materiálov a technológií. Taktiež boli poskytované konzultácie na riešenie problémov z tejto oblasti.

8. Iné projekty (ústavné, na objednávku rezortov a pod.)

II. Medzinárodné projekty riešené na pracovisku:

1. Projekty 6. rámcového programu EÚ (neuvádzať projekty ukončené pred r. 2007)

1. Názov projektu

Marie Curie European Re-Integration Grants (ERG):
Od lineárnych cez kefovité k hypervetveným polymérom.
(From linear via brush to hyperbranched polymers.)

Zodpovedný riešiteľ za Ústav polymérov: **Búcsiová Ľubica**
Dátum začiatku/ukončenia riešenia projektu: **10.2005 – 09.2007**
Evidenčné číslo projektu: **MERG-CT-2005-021612**
Finančný príspevok: **do septembra 2006 40 000 € (MARIE CURIE ACTIONS Human Resources and Mobility)**
Spoluriešiteľské inštitúcie: **---**
Dosiahnuté výsledky:

K 30. septembru 2007 skončil Marie Curie reintegračný grant „Z lineárnych cez kefovité k hypervetveným polymérom“, ktorý bol v druhom roku riešenia bez finančného príspevku. Riešenie projektu spočívalo v polymerizácii monoméru 2- hydroxyetyl 2- metakrylátu metódou ATRP polymerizácie. Počas riešenia sa optimalizovali reakčné podmienky polymerizácie – efekt ligandu, výber iniciátora. Študovalo sa zavedenie a odstránenie ochranných skupín a naviazanie fluorescenčnej skupiny na konce polymérnych reťazcov. Účinnosť zavedenia aktívnej skupiny použitými reakčnými postupmi nebola doteraz dostatočná, práca na danej problematike pokračuje aj v súčasnosti.

2. Názov projektu:

IP 6RP EÚ
P. Cezanne: Integrovanie nanobiológie a ICT pre zabezpečenie implantovateľného monitorovacieho systému pre kontinuálnu starostlivosť o diabetického pacienta.
(P. Cezanne: Development of an implantable bio-sensor for continuous care and monitoring or diabetic patients.)

Zodpovedný riešiteľ za Ústav polymérov SAV: **Lacík Igor**
Dátum začiatku/ukončenia riešenia projektu: **07.2006 – 06.2010**
Evidenčné číslo projektu: **031867**
Spoluriešiteľské inštitúcie: **Meir Hospital, Tel Aviv University, Izrael (koordinátor), Foundation of Research and Technology, Kréta, Grécko, Centro Nacional de Microelectrónica, Madrid, Španielsko, Fraunhofer Gesellschaft, Mníchov, Nemecko, Philips FIMI, Saronno, Taliansko, Robert Bosch GmBH, Stuttgart, Nemecko, Bar Ilan University, Ramat Gan, Izrael, Protech AF, Devon, Anglicko, Siveco Romania SA, Bucharest, Rumunsko, MicroTech S.r.l., Pisa, Taliansko, OSM-DAN Ltd., Rehovot, Izrael, Afcon Industries, Ltd., Tikva, Izrael, Tadiran Batteries Ltd., Kiryat Ekron, Izrael**
Finančné zabezpečenie: **2 117 325,-Sk (63010 € - 25% z 1.splátky za 1. rok riešenia – EÚ)+1 800 000.-Sk (P SAV)**

Dosiahnuté výsledky:

V rámci riešenia IP 6RP EU P. Cezanne sa riešila téma prípravy hydrogélov vhodných na imobilizáciu proteínov a buniek citlivých na glukózu na princípe FRET. Pripravili sa hydrogély na báze alginátov, silánov a syntetických polymérov. Výsledky potvrdili, že proteín prežíva enkapsulačný proces a jeho funkčnosť závisí od typu matrice, v ktorej sa nachádza. Syntetické hydrogély na báze zwitterionových polymérov pripravené redox polymerizáciou vykazujú zatiaľ najoptimálnejšie prostredie pre proteín. V silánových hydrogéloch sa podarilo nastaviť porozitu gélu tak, že dochádza k minimálnemu vyplavovaniu proteínov z týchto matríc. Paralelne s prípravou gélov boli vyvinuté techniky pre testovanie ich mechanických vlastností, permeability, difúzie glukózy a optických vlastností. Viabilita imobilizovaných buniek závisela od typu gélu a bola sledovaná fluorescenčnou mikroskopiou v spojení s live-dead kitmi príp. inými technikami.

Publikácie 2007:

1. KASÁK, Peter – KRONEKOVÁ, Zuzana – STACH, Marek – CHORVÁT, Dušan – LACÍK, Igor
Novel biocompatible zwitterionic materials. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 111. Výveska 3Po-Po27

2. STACH, Marek – KASÁK, Peter - LACÍK, Igor
Electrografting of polymers onto electroconductive substrate as a tool for formation of non-biofouling surfaces for biomedical applications. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 118. Výveska 3Po-Po39

3. KRONEKOVÁ, Zuzana – DANKO, Martin – KRUPA, Igor – LACÍK, Igor
Optimalization of conditions to supress syneresis and swelling of alginate gels. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 115. Výveska 3Po-Po33

2. Projekty 7. rámcového programu EÚ

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3. Multilaterálne projekty v rámci vedeckých programov COST, INTAS, EUREKA, ESPIRIT, PHARE, CERN, NATO, UNESCO, IAEA, ESF a iné.

1. Názov projektu:

Reaktívna kompatibilizácia zmesí PGB/Ecoflex.
(Reactive compatibilization of PHB/ECOFLEX blends.)

***Zodpovedný riešiteľ za Ústav polymérov*: Chodák Ivan**
***Dátum začiatku/ukončenia riešenia projektu:* 12.2006 – 11.2007**
***Evidenčné číslo projektu*: projekt BASF AG, Ludwigshafen, Nemecko**
***Spoluriešiteľské inštitúcie*: ---**
***Finančné zabezpečenie:* 1 512 135.-Sk (45 000 €)**
Dosiahnuté výsledky:

V rámci spolupráce sa podrobne prešetrovali možnosti zlepšenia mechanických vlastností polyhydroxybutyrátu cestou zamiešania biodegradovateľného plastu Ecoflex, pričom pre zvýšenie kompatibilizácie sa použilo reaktívne zosietenie na rozhraní fáz. V rámci tohto projektu sa riešili nasledovné čiastkové úlohy:

- Zosietenie samotného Ecoflexu iniciované peroxidmi
- Zosietenie zmesi PHB/Ecoflex iniciované peroxidmi
- Optimalizácia zloženia zmesi PHB/Ecoflex s obsahom ďalších zložiek, napr plastifikátorov, stabilizátorov, atď.
- Hľadanie možností zníženia termickej degradácie PHB počas spracovania

2. Názov projektu:

Kritické hodnotenie propagačných rýchlostných konštánt radikálovej polymerizácie vodorozpustných polymérov polymerizovaných vo vodnej faze.
(Critically evaluated propagation rate coefficients for free-radical polymerization of water-soluble monomers polymerized in the aqueous phase.)

***Zodpovedný riešiteľ za Ústav polymérov , koordinátor projektu*: Lacík Igor**
***Dátum začiatku/ukončenia riešenia projektu:* 01.2004– 12.2007**
***Evidenčné číslo projektu:* IUPAC 2004-034-1-400 (www.iupac.org/projects/2004/2004-034-1-400.html)**
***Spoluriešiteľské inštitúcie*: Queen's University (Kingston), BASF (Ludwigshafen), University Pierre et Marie Curie (Paris), Key Centre for Polymer Colloids (Sydney), CAMD UNSW (Sydney), Institute of Physical Chemistry (Göttingen), Polymer Standards Service (Mainz), EPFL (Lausanne)**
***Finančné zabezpečenie:* 3000 USD - mobilita**
Dosiahnuté výsledky:

Na základe širokej spolupráce sa pripravili podklady pre porovnanie rýchlostných konštánt stanovených na rôznych svetových pracoviskách. Pre kyseliny metakrylovú sa opublikoval prvý „benchmark“ článok týkajúci sa polymerizácie vo vodnej fáze a stanoveniu rýchlostnej konštanty propagácie k_p.

Publikácie 2007:

1. BEUERMANN, S. – BUBACK, M. – HESSE, P. – KUCHTA, F. D. – LACÍK, Igor – VAN HERK, A. M.
   Critically evaluated rate coefficients for free-radical polymerization. Part 6: Propagation rate coefficient of methacrylic acid in aqueous solution. In *Pure and Applied Chemistry*. Vol. 79, no. 8, (2007), pp. 1463–1469. (1.920 - IF_{2006})

3. Názov projektu:

Určenie rýchlostných konštánt radikálovej polymerizácie vodorozpustných monomérov so špeciálnym dôrazom na nabité a ionizovateľné monoméry.
(Determination of rate coefficients of water-soluble monomers with special emphasis on charged/ionizable monomers.)

Zodpovedný riešiteľ za Ústav polymérov: **Lacík Igor**
Dátum začiatku/ukončenia riešenia projektu: **06.2004 – 05.2007 - predĺžený do 05.2008**
Evidenčné číslo projektu: **projekt BASF AG, Ludwigshafen, Nemecko**
***Spoluriešiteľské inštitúcie*:** **Institute of Physical Chemistry, Göttingen, Nemecko (Prof. M. Buback) a Queen's University, Kingston (Dr. R. Hutchinson)**
Finančné zabezpečenie: **504 045.-Sk (15 000 €)**
Dosiahnuté výsledky:

Určila sa závislosť rýchlostnej konštanty propagácie, k_p, od koncentrácie monoméru, c_M, a konverzie pre kyselinu metakrylovú, kyselinu akrylovú a *N*-vinylpyrolidón metódou pulznej laserovej polymerizácie v prepojení na gélovú permeačnú chromatografiu. Táto informácia dovoľuje modelovanie reálnych polymerizačných procesov do vysokých konverzií. Publikovali sa experimentálne výsledky ohľadne závislosti k_p kyseliny akrylovej od frekvencie pulzov ako prvého akrylátového monoméru s poukázaním na vnútromolekulový prenos, ktorý bol zatiaľ len predpovedaný simuláciami. Určili sa rýchlostné konštanty propagácie rôznych N−vinylamidov, u ktorých sa ukončili práce ohľadne rýchlostnej konštanty propagácie pre N−vinylpyrolidon.

Publikácie 2007:

1. BEUERMANN, S. – BUBACK, M. – HESSE, P. – KUKUČKOVÁ, S. – LACÍK, Igor
   Propagation rate coefficient of non-ionized methacrylic acid radical polymerization in aqueous solution. The effect of monomer conversation. In *Macromolecular Symposia*. Vol. 248, (2007), pp. 41-49. (bez IF_{2006})

2. BEUERMANN, S. – BUBACK, M. – HESSE, P. – KUKUČKOVÁ, S. – LACÍK, Igor
   Propagation kinetics of free-radical methacrylic acid polymerization in aqueous solution. The effect of concentration and degree of ionization. In *Macromolecular Symposia*. Vol. 248, (2007), pp. 23-32.

3. STACH, Marek – LACÍK, Igor – CHORVÁT, Dušan Jr – BUBACK, M. – HESSE, P. – HUTCHINSON, R.A. – TANG, L.
   Propagation rate coefficient for radical polymerization of *N*-vinyl pyrrolidone in aqueous solution obtained by PLP−SEC. In *Macromolecules*, odoslané

4. UČŇOVÁ, Lucia – CHORVÁT, Dušan Jr. – LACÍK, Igor
   Effect of couterion size on propagation rate for the aqueous phase polymerization of ionized methacrylic acid determined by PLC/SEC technigue. In *ChemZi Chemical. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 211. Výveska 3Po-Ut36

4. Názov projektu:

COST 865: Multirozmerová interakčná analýza v bioenkapsulácii.
(Bioencapsulation multiscale interaction analysis.)

Zodpovedný riešiteľ za Ústav polymérov: **Lacík Igor**
Dátum začiatku/ukončenia riešenia projektu: **01. 2006 – 12.2009**
Evidenčné číslo projektu: ---
***Spoluriešiteľské inštitúcie*: University Hospital Groningen - koordinátor WG2, TH Aachen University, Ghent University, Dipartimento Farmaceutico Parma, Faculty of Pharmacy Vitoria, NTNU Trondheim, Institute of Chemistry SAS Bratislava, ENITIAA de Nantes, Emory University Atlanta, University of Technology and Agriculture, Institut de génie biomédical Montreal, Technological University of Compiègne, Chemický ústav SAV**
Finančné zabezpečenie: **mobilita**
Dosiahnuté výsledky:

Pre COST konzorcium sa stanovili parametre rôznych typov mikrokapsúl s dôrazom na permeabilitu, optické a mechanické vlastnosti pre porovnanie výsledkov z rôznych pracovísk.

5. Názov projektu:

The ChicagoProject: Funkčná liečba cukrovky. (Functional cure of diabetes.)
Projekt sponzorovaný Washington Health Square Foundation and Christopher Family

***Zodpovedný riešiteľ za Ústav polymérov*: Lacík Igor**
Dátum začiatku/ukončenia riešenia projektu: **05.2007 – 12.2010**
Evidenčné číslo projektu: **---**
Spoluriešiteľské inštitúcie: **University of Illinois, Chicago, USA – koordinátor (**Prof. Oberholzer)**, NTNU Trondheim Nórsko, A+T Specialties S.A. Švajčiarsko, University of Illinois Chicago Urbana, USA, UNSW Sydney, Australia, University of Perugia, Taliansko**
Finančné zabezpečenie: **891 700 Sk (38 990 US$)**
Dosiahnuté výsledky:

V rámci Chicago Projektu sa uskutočnili ďalšie enkapsulácie ľudských pankreatických ostrovčekov v novovytvorenom sterilnom biologickom laboratóriu na Ústave polymérov SAV. Pre pracoviská zahrnuté v tomto projekte (NTNU Trondheim, UNSW Sydney) sa charakterizovali parametre rôznych typov mikrokapsúl s dôrazom na permeabilitu určenú inverznou SEC a konfokálnou mikroskopiou, veľkosť a hrúbku membrány a mechanické vlastnosti. Ústav polymérov SAV sa zúčastňuje na príprave dokumentu pre FDA tzv. Investigational New Drug, ktorého náplňou je príprava podmienok pre klinické transplantácie enkapsulovaných ostrovčekov fáza I/II.

Publikácie 2007:

1. QI, M. − STRAND, B. L. − LACÍK, Igor − WANG, Y. − BARBARO, B. − GANGEMI, A. − SALEHI, P. − KUECHLE, J. − BENEDETTI, E. − HUNKELER, D. − SKJAK-BRAEK, G. − OBERHOLZER. J.
   Prolonged immunosuppression-free survival of TAM encapsulated human islet grafts in diabetic, immunocompetent mice. In *American Journal of Transplantation.* Vol. 295, Suppl. 2, (2007), p. 223. (6.843 - IF_{2006})

2. LACÍK, Igor − CHORVÁT, Dušan Jr.
   Visualisation techniques in the characterization of polymer microcapsules: CLSM and AFM.

Submitted as book chapter for *The Bioartificial Endocrine Pancreas*, Ed. J.-P. Halle, Research Signpost, Trivandrum, India, odoslané

3. KOLLÁRIKOVÁ, Gabriela – LACÍK, Igor – ŠTRBÁK, V. – BAČOVÁ, Z. – HUNKELER, D .- OBERHOLZER, M. Q. J. – MICHALKA, P. – CHORVÁT, Dušan Jr. – PODSKOČOVÁ, J. Encapsulation of islets of Langerhans in polymeric microcapsules. In *ChemZi Chemical Papers. Roč. 3, č. 1., 2007&, ISSN 1336-7242 – zborník 59. Zjazdu chemických spoločností, 2.-6. september 2007, Tatranské Matliare, Slovenská republika.* s. 119. Výveska 3Po-Po40

6. Názov projektu:

Podpora trhu pre lekárske prístroje.
(Market surveillance support on medical devices (MOH Medical Device Component) between Turkey and Slovakia.)

***Zodpovedný riešiteľ za Ústav polymérov*: Rychlý Jozef**
***Dátum začiatku/ukončenia riešenia projektu:* 01.2007 – 12.2007**
***Evidenčné číslo projektu*: Twinning Project No – TR04/IB/EC/02**
***Spoluriešiteľské inštitúcie*: Metrologický ústav, Bratislava; Golbasi Center, Refik Saydam Institute, Ankara**
***Finančné zabezpečenie:* mobilita**
Dosiahnuté výsledky:

V roku 2007 sa uskutočnila Activity 6.9.2: First and second consultancy visit on training for Identification and Quantification of Degradation Products from Polymeric Medical Devices (EN ISO 10 993-12 and 10 993-13), počas ktorých sa pracovníci Golbasi Center, Refik Saydam Institute, Ankara zacvičovali na merania na prístrojoch termickej analýzy DSC a termogravimetrie.

Publikácie 2007:

1. RYCHLÝ, Jozef - KOCER, A. - TANIS, F. - MATISOVÁ-RYCHLÁ, Lyda – JANIGOVÁ, Ivica – CSOMOROVÁ, Katarína
   Decomposition of solid benzoyl peroxide; comparison of chemiluminescence and DSC experiments. Odoslané do *Thermochimica Acta*

4. Projekty v rámci medzivládnych dohôd o vedecko - technickej spolupráci (Grécko, ČR, Nemecko a iné).

1. Názov projektu:

Príprava polymérnych elektrovodivých nanokompozitov a senzorov.
(Preparation of electroconductive polymeric nanocomposites and sensors.)

***Zodpovedný riešiteľ za Ústav polymérov*: Omastová Mária**
***Dátum začiatku/ukončenia riešenia projektu:* 01.2006 – 12.2007**
***Evidenčné číslo projektu:* SK-CZ-04906, bilaterálny Slovensko-Český projekt MVTS**
***Spoluriešiteľské inštitúcie*: Univerzita Tomáše Bati ve Zlíně, Fakulta technologická, Centrum polymerních materiálů, Zlín, Česká republika**
***Finančné zabezpečenie:* 34 000.-Sk**
Dosiahnuté výsledky:

Vodivé polymérne kompozity pozostávajúce zo silikónového kaučuku a polypyrolu (PPy) chemicky syntetizovaného v prítomnosti aniónového tenzidu, boli pripravené odlievaním do formy. Ako oxidant pri príprave PPy sa použil $FeCl_3$. Kompozity obsahovali od 2,2 do 8,5

obj. %. PPy. Perkolačný prah vodivosti tohto typu kompozitov je nižší ako 4 obj. % PPy. Ak je tlaková deformácia kompresiou aplikovaná na kompozity vyššia ako 11 %, elektrická vodivosť kompozitov obsahujúcich viac ako 4 obj. % PPy významne poklesne. Nameraný pokles vodivosti bol päť rádov. Výsledky testovania vplyvu cyklickej deformácie na vodivosť v 50-tich cykloch ukázali veľmi dobrú reprodukovatelnosť. Kompozity na báze silikónového kaučuku a polypyrolu je možné použiť na výrobu tlakových senzorov v mikroelektronike a využiť tak ich "prepínací efekt", výrazný pokles vodivosti pri tlakovej deformácii.

V ďalšej časti práce sa modifikovali mnohostenné uhlíkové nanotrubičky (CNT) polypyrolom vo vodnej suspenzii použitím vysokovýkonného ultrazvuku. Pripravila sa vodivá forma tohto plniva a taktiež nevodivá forma, obe sa použili ako plnivo do kaučukových matríc. Stanovoval sa perkolačný prah vodivosti pri zamiešaní 1 až 10 hm. % plniva a porovnávala sa jeho hodnota s hodnotou perkolácie, keď sa ako plnivo použili nemodifikované CNT a vodivé sadze. Predbežné výsledky ukazujú, že modifikácia povrchu CNT mierne zvyšuje perkolačný prah, ktorý bol pri použití nemodifikovaných CNT okolo 1,5 hm %. Táto hodnota je však neporovnateľne nižšia ako je perkolácia pri použití vodivých sadzí, ktorá bola 8 hm %. Testovali sa tiež elektromagnetické vlastnosti pripravených kompozitov.

Publikácie a prezentácie 2007:

1. PELÍŠKOVÁ, M. – VILČÁKOVÁ, J. – MOUČKA, R. – SÁHA, P. – QUADRAT, O. – STEJSKAL, J. – OMASTOVÁ, Mária
   Control of electric and dielectric properties of conductive polymer composites by compression deformation. In *Abstract Book of the Eurofillers 2007, August 26-30, 2007, Zalakaros, Hungary.* p. 84, and 2 pg in CD-Rom. Výveska.
2. VILČÁKOVÁ, J. – KAZANTSEVA, N. – SÁHA, P. – STEJSKAL, J. – OMASTOVÁ, Mária
   Polymeric composites with modified milti-wall carbon nanotubes. In *Book of Abstracts of the 7th International Symposium on Crystaline Organic Metals, Semiconductors and Ferromagnets, ISCOM 2007, September 24-29, 2007, Peniscola, Spain.* p. 114.

5. Bilaterálne projekty

1. Názov projektu:

Nové metódy molekulovej charakterizácie syntetických polymérov a biopolymérov.
(Novel methods for molecular characterization of synthetic polymers and biopolymers.)

Zodpovedný riešiteľ za Ústav polymérov: **Berek Dušan**
Dátum začiatku a ukončenia projektu: **01. 2007 - 12. 2009**
Spoluriešiteľské inštitúcie: **Institute of Chemical Methodologies CNR, Montelibretti (Rome), Institute of Chemistry and Technology of Polymeric Materials CNR, Catania a Institute of Chemistry of Macromolecules CNR, Milan, all Italy**
Finančné zabezpečenie: **mobilita** v rámci MAD medzi SAV a talianskym CNR
Dosiahnuté výsledky:
a/ Prvá verzia spoločnej publikácie „HPLC of Proteins"
b/ Prvá verzia kapitoly „HPLC of Synthetic Polymers" do monografie „Handbook of HPLC", ktorej editorom je spoluriešiteľ tohoto projektu Prof. D. Corradini.

Publikácie v r. 2007:

1. REIJENGA, J. C. – KINGMA, W. J. – BEREK, Dušan – HUTTA, M.
   GPCSIM – an instrument simulator of polymer analysis by size exclusion chromatography for demonstration and training purposes. In *Acta Chimica Slovenica*. Vol. 54, (2007), pp. 79-87. (0.703 - IF_{2006})

2. RUSS, A. – BEREK, Dušan
Enthalpy assisted size exclusion chromatography. Part 2. Adsorption retention mechnism. In *Journal of Separation Science*. Vol. 30, (2007), pp. 1852–1859. (2.535 - IF_{2006})

3. SHUNDO, A. - FUKUI, M. – TAKAFUJI, M. – AKASAKA, K. – OHRUI, H. – BEREK, Dušan – IHARA, H.
Selectivity enhancement for *trans*-2-(2,3-anthracenedicarboximido)cyclohexane-derived diastereomers in HPLC by using an ordered organic stationary phase. In *Analytical Sciences*. Vol. 23, (2007), pp. 1-5. (1.589 - IF_{2006})

4. ŠAUŠA, O. – KRIŠTIAK, J. – BEREK, Dušan – ISKROVÁ, M.
Column packings for high-performance liquid chromatography and positron annihilation lifetime spectroscopy. In *Radiation Physics and Chemistry*. Vol. 76, (2007), pp. 271 – 274. (0.868 - IF_{2006})

5. YILDIZ, U. - CAPEK, Ignác - BEREK, Dušan - SAROV, Y. - RANGELOW, I.W.
Inverse microemulsion copolymerization of butyl acrylate and acrylamide: kinetics, colloidal parameters and some model applications. In *Polymer International*. Vol. 56, (2007), p. 364-370. (1.475 - IF_{2006})

2. Názov projektu:

Syntéza, molekulová charakterizácia a čistenie blokových kopolymérov.
(Synthesis, molecular characterization and purification of block-copolymers.)

Zodpovedný riešiteľ za Ústav polymérov: **Berek Dušan**
Dátum začiatku a ukončenia projektu: **01. 2005 - 12. 2006**
Spoluriešiteľské inštitúcie: **UMR 6517-CBRL CNRS (University of Marseille) za spoluúčasti UMR 5629-LCPO CNRS (University of Bordeaux), Francúzsko**
Finančné zabezpečenie: **mobilita** v rámci MAD medzi SAV a francúzskym CNRS
Dosiahnuté výsledky:

Prednášky a krátke kurzy na spoluriešiteľských pracoviskách. Využitie metódy vypracovanej počas projektu APVT Analýza minoritných zložiek v komplexných polymérových systémoch (Analysis of minor components in complex polymer systems) na separáciu spolu 23 vzoriek blokových kopolymérov pripravených na spolupracujúcich ústavoch v Marseille a Bordeaux.

3. Názov projektu:

Štúdium stereokomplexov (*R*) a (*S*)-polylaktidov a tenkých filmov pripravených z týchto materiálov.
(Studies of (*R*) and (*S*)-polylactide stereocomplexes and the thin films made therefrom.)
Projekt dvojstrannej slovensko-poľskej spolupráce SAV-PAV

Zodpovedný riešiteľ za Ústav polymérov: **Danko Martin**
Dátum začiatku a ukončenia projektu: **01. 2007 - 12. 2009**
Spoluriešiteľské inštitúcie: **Center of Molecular and Macromolecular Studies PAS, Lodz, Poland**
Finančné zabezpečenie: **mobilita**
Dosiahnuté výsledky:

V rámci projektu boli pripravené lineárne polylaktidy s opačnou optickou otáčavosťou poly(R-laktid) a poly(S-laktid). Polyméry boli funkcionalizované na koncovej –OH skupine pyrénovou fluorescenčnou značkou. Dané polylaktidy tvoria stereokomplexy interakciou cez

vodíkové väzby v zmesi v tavenine alebo zrážaním do zrážadla z jednotlivých roztokov. V tejto práci sa využila tvorba excimérov pyrénu, ktoré vykazujú inú fluorescenciu ako monomérny pyrén, pri tvorení stereokomplexov polylaktidových reťazcov. Fluorescenciou bolo možné sledovať tak kinetiku procesu ako aj množstvo vytvoreného stereokomplexu. Najviac exciméru (stereokomplexu) pri rovnakých koncentráciách sa tvorilo v acetonitrile, menej v tetrahydrofuráne a žiadny stereokomplex nebol pozorovaný v chloroforme. Zvýšením teploty pri tvorbe stereokomplexu sa pozorovala nižšia intenzita exciméru. Slabé vodíkové väzby sú pri zvýšenej teplote narušané a proces stereokomplexácie je pomalší. Sledovaním tvorby stereokomplexov s polymérom, ktorý mal pyrén na opačnej strane reťazca sa zistilo, že paralelná stereokomplexácia dvojice polylaktidov je preferovaná, hoci stereokomplex sa tvoril aj antiparalelne.

4. Názov projektu:

Skúmanie povrchových vlastností maleinizovaných polyolefínov.
(Investigation of surface properties of maleinized polyolefins.)

Zodpovední riešitelia za Ústav polymérov: **Florián Štěpán, Novák Igor**
Dátum začiatku a ukončenia projektu: **01.2005 – 01.2008**
Spoluriešiteľské inštuitúcie: **Ústav makromolekulární chemie AV ČR Praha, Česká republika**
Finančné zabezpečenie: **mobilita**
Dosiahnuté výsledky:

Vyhodnotenie povrchových energií malenizovaného iPP pri teplote 22 ^{o}C ukázalo významný rast ich hodnôt v porovnaní s neočkovaným iPP, najmä v dôsledku zvýšenia polárnej zložky povrchovej energie. Na druhej strane sa zistilo, že rozdiely v nameranej povrchovej energii tavenín vzoriek s rôznym stupňom očkovania maleínanhydridom boli menšie ako rozdiely v povrchových energiách medzi jednotlivými druhmi neočkovaných polypropylénov. Zistilo sa, že v pevnom skupenstve povrchová energia polyolefínu rastie pri vyššom stupni očkovania. V polymérnej tavenine sa však látky, ktoré by mohli zvýšiť povrchovú energiu systému premiestnia do objemovej fázy z toho dôvodu, aby celý systém disponoval minimálnou energiou a v dôsledku toho signifikantné zvyšovanie povrchovej energie očkovaného iPP v tavenine nebolo pozorované.

5. Názov projektu:

Nové inteligentné polyméry na báze 2-oxazolínov.
(New stimuli sensitive polymers based on 2-oxazolines.)
Projekt dvojstrannej slovensko-poľskej spolupráce SAV-PAV

Zodpovedný riešiteľ za Ústav polymérov: **Kronek Juraj**
Dátum začiatku a ukončenia projektu: **01. 2007 - 12. 2009**
Spoluriešiteľské inštitúcie: **Center of Polymer and Coal Materials PAS, Zabrze**, **Poland**
Finančné zabezpečenie: **mobilita**
Dosiahnuté výsledky:

V rámci projektu sa pripravili viacfunkčné iniciátory obsahujúce atóm halogénu alebo ester arénsulfónových kyselín. V našom prípade sme použili estery 4-toluénsulfónovej kyseliny a 4-nitrobenzénsulfónovej. Obidve iniciačné častice sa líšia reaktivitou, čo má značný vplyv aj na priebeh samotnej polymerizácie. Pripravili sa nízkomolekulové iniciátory odvodené od trimetylolpropánu, bis(trimetylolpropánu) a dipentaerytritolu obsahujúce 3, 4 a 6 iniciačných skupín v jednej molekule. Osobitnou časťou bola príprava hypervetveného polyméru na báze

polyglycerolu s 13 transformovanými hydroxylovými skupinami. Katiónovou polymerizáciou iniciovanou uvedeným makroiniciátorom sa získali poly(2-etyl-2-oxazolínu) s hviezdicovou štruktúrou. Zmenou pomeru koncentrácie monoméru a iniciátora sa pripravili polyméry s rôznymi mólovými hmotnosťami.

6. Názov projektu:

Materiály prechádzajúce fázovou premenou tvorené polymérnymi matricami a parafínmi.
(Phase change materials on the base of polymeric matrices and paraffin waxes.)

Zodpovedný riešiteľ za Ústav polymérov: **Krupa Igor**
Dátum začiatku a ukončenia projektu: **01.2005 –**
Spoluriešiteľské inštuitúcie: **Department of Chemistry , University of The Free State, South Africa, (Dr. A. S. Luyt)**
Dosiahnuté výsledky:

Získali sme výsledky ktoré umožňujú optimalizovať limitné podmienky pri príprave fázovo stabilných PCM.

Publikácie 2007:

1. KRUPA, Igor – MIKOVÁ, Gizela – LUYT, A. S.
   Polypropylene as a potential matrix for the creation of shape stabilized phase change materials. In *European Polymer Journal*. Vol. 43, (2007), pp. 895–907. (2.113 - IF_{2006})

2. KRUPA, Igor – MIKOVÁ, Gizela – LUYT, A. S.
   Shape stabilized phase change materials based on low density polyethylene and paraffin waxes. In *European Polymer Journal*. Vol. 43, (2007), pp. 4695-4705. (2.113 - IF_{2006})

7. Názov projektu:

Funkcionalizované uhlíkové nanotrubičky – inovačné plnivo pre prípravu moderných elektrovodivých polymérnych nanokompozitov.
(Functionalized carbon nanotubes - an innovative filler for a processing of advanced electro-conductive polymeric nanocomposites.)

Zodpovedný riešiteľ za Ústav polymérov: **Omastová Mária**
Dátum začiatku/ukončenia riešenia projektu: **01.2006 – 12.2007**
Evidenčné číslo projektu: **bilaterálny Slovensko-Nemecký projekt**
***Spoluriešiteľské inštitúcie*: Leibniz-Institut für Polymerforschung Dresden e.V., Dresden, Germany (Dr. J. Pionteck)**
Finančné zabezpečenie: **mobilita** v rámci MAD medzi SAV a nemeckým DAAD
Dosiahnuté výsledky:

Pripravili sa nanokompozity s polypropylénovou (PP) matricou a mnohostennými uhlíkovými nanotrubičkami (CNT). CNT sa povrchovo modifikovali a pripravilo sa deväť rôznych kompozitov s PP matricou NOVOLEN 1106H a s modifikovanými CNT, pričom koncentrácia plniva bola 1, 2, 3, 4, 5 hm. %**.** Plnivá boli modifikované počas pôsobenia silného ultrazvuku (s výkonom 360 W) vo vodnom kúpeli, menovite polypyrolom (PPy) s a bez prítomnosti aniónového tenzidu, kyseliny dodecylbenzénsulfónovej (DBSA), ďalej aniónovým tenzidom DBSA, katiónovým tenzidom cetyltrimetylamónium bromidom (CTAB) a následne aj ich kombináciou, kde CTAB pôsobil ako kotenzid. Ďalší typ modifikácie bol použitím disulfátu polyetylénglykolu 4000 (PEG-SO_3H). V prípade kombinácie dvoch tenzidov DBSA a CTAB

sme použili aj úpravu pri slabšom ultrazvuku (s výkonom 64 W) ako aj ekvimolárny pomer týchto dvoch tenzidov.

PP/CNT kompozity boli namiešané v mikrokompounderi pri rôznych podmienkach miešania. Z najlepších dosiahnutých vodivostí kompozitov s nemodifikovanými CNT, $8{,}3\times10^{-3}$ S/štvorec sa nakoniec vybrali podmienky pre prípravu ostatných kompozitov: 140 rpm, 15 min, 210 °C.

Perkolácie v niektorých sériách sa dosiahli už pri obsahu plniva menšom ako 3 hm. %. Pri PP kompozitoch s nemodifikovanými CNT sa dosiahli lepšie vodivosti ako v prípade modifikovaných CNT, okrem modifikácie, keď sa použila kombinácia tenzidov DBSA a CTAB. Zníženie vodivosti v prípade polymérneho modifikátora PEG-SO_3H môže byť spôsobené zavedením nevodivých oblastí, ktoré môžu narúšať efektívny transport náboja. Okrem toho môže byť príčinou nižšej vodivosti určitý stupeň polámania CN počas silnej sonifikácie, kedy okrem poškodenia štruktúry nanotrubičiek dochádza aj k zmenšeniu zoštíhlovacieho pomeru. Navyše lepšia dispergácia CNT v dôsledku dôslednejšieho rozbitia zapletencov vplyvom silnejšieho ultrazvuku môže viesť k vzniku väčšieho počtu nukleačných centier pre kryštalizáciu a paradoxne k vytvoreniu väšieho počtu energetických bariér vo forme PP kryštalitov pre transport elektrického náboja, ako naznačujú aj výsledky zo závislosti Youngovho modulu na teplote. Bolo to zrejmé aj zo zlepšenej vodivosti pri slabšom ultrazvuku, keď sa porovnala vodivosť CNT-DBSA/CTAB modifikovaných silnejším a slabším ultrazvukom. Pri ekvimolárnom pomere DBSA/CTAB sa dosiahla lepšia vodivosť, ako je tomu v prípade, keď je DBSA v nadbytku 10:1. Je to pravdepodobne spôsobené efektívnejším zavedením alkylových reťazcov na povrch CN, čím sa dosiahlo zvýšenie kompatibility s PP matricou.

Sledovali sme aj vplyv prítomnosti pôvodných ako aj modifikovaných CNT na fotooxidačnú stabilitu PP kompozitov. Z rozdielnej kinetiky fotooxidácie po indukčnej perióde je zrejmé, že CNT pôsobia nielen ako UV absorbér, ale sa aj aktívne zapájajú do interakcií so vznikajúcimi štruktúrami. V prípade modifikovaných CNT je fotostabilizácia PP matrice vo všetkých prípadoch horšia, čo okrem faktu, že skutočný obsah CNT je o cca. 20 hm. % menší (po odčítaní množstva použitého modifikátora), môže byť spôsobené aj blokovaním aktívnych centier naviazaním modifikátora.

8. Názov projektu:

Príprava a elektrické vlastnosti vodivých polymérnych kompozitov.
(Preparation and electrical properties of conducting polymer composites.)

Zodpovedný riešiteľ za Ústav polymérov: **Omastová Mária**
Dátum začiatku a ukončenia projektu: **01.2004 – 12.2007**
Spoluriešiteľské inštuitúcie: **Ústav makromolekulární chemie AV ČR a Matematicko-fyzikální fakulta UK, Praha, Česká republika**
Finančné zabezpečenie: **mobilita**
Dosiahnuté výsledky:

Polypyrol (PPy) a polyanilín (PANI) sa syntetizovali za rovnakých podmienok, chemickou oxidačnou polymerizáciou príslušného monoméru. Ako oxidant sa použil peroxodisíran ammóny. Pretože polymerizácia anilínu prebieha iba v kyslom prostredí, do polymerizačnej zmesi sa pridávala HCl. Sledovala sa kinetika polymerizácie, zo sledovaní vyplynula rozdielnosť procesov polymerizácie, zatiaľ čo pyrol polymerizuje okamžite, polymerizácia anilínu začne až po cca piatich minútach. Stanovoval sa výťažok polymerizácie, ktorý sa zvyšoval so zvyšujúm sa molárnym pomerom oxidant/monomér. Merná elektrická vodivosť dosiahla hodnotu $10^0 S\cdot cm^{-1}$ pre PANI a 10^{-2}–10^{-1} $S\cdot cm^{-1}$ pre PPy. Stabilita pripravených vzoriek sa skúmala počas deprotonizácie oboch pripravených polymérov hydroxidom

ammónnym. FTIR spektrá ammóniových solí, získaných po deprotonizácii ukázali, že PANI je protonovaný najmä síranovými aniónmi, ktoré vznikajú počas oxidácie z peroxodisíranu amónneho. V prípade PPy sa identifikovali tiež chloridové ióny ako ko-dopanty.

Publikácie 2007:

1. BLINOVA, N. V. – STEJSKAL, J. – TRCHOVÁ, M. – PROKEŠ, J. - OMASTOVÁ, Mária Polyaniline and polypyrrole: A comparative study of the preparation. In *European Polymer Journal*. Vol.43, (2007), pp. 2331–2341. (2.113 - IF_{2006})

9. Názov projektu:

Štúdium povrchových vlastností poly(imid–siloxán)ových blokových kopolymérov a príprava adhezív na ich báze.
(Study of surface properties of poly(imide-siloxane) block copolymers and preparation of adhesives on their base.)

Zodpovední riešitelia za Ústav polymérov: **Novák Igor, Florián Štěpán**
Dátum začiatku a ukončenia projektu: **01.2005 – 01.2008**
Spoluriešiteľské inštuitúcie: **Ústav polymérov, VŠCHT Praha, Česká republika**
Finančné zabezpečenie: **mobilita**
Dosiahnuté výsledky:

Poly(imid-siloxán)ové blokové kopolyméry s rôznym obsahom polysiloxánu boli skúmané z hľadiska povrchových a adhéznych vlastností. Zistil sa významný rast hydrofóbnosti skúmaných blokových kopolymérov už pri nízkom obsahu siloxánu (10 hmot. %), ktorý možno prisúdiť mikrofázovej separácii siloxánu v kopolyméri. Ako následok rastu hydrofóbnosti kopolymérov bol zistený pokles pevností adhézneho spoja v odlupovaní a v šmyku ku polyepoxidu. AFM, SEM a TEM mikrosnímky potvrdili nárast drsnosti povrchu fólie v dôsledku zvyšovania obsahu siloxánu v blokovom koplyméri.

6. Iné projekty financované zo zahraničných zdrojov

Príloha č. 3

3. Vedecký výstup

1) Vedecké monografie vydané doma

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2) Vedecké monografie vydané v zahraničí

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3) Knižné odborné publikácie vydané doma

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4) Knižné odborné publikácie vydané v zahraničí

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5) Kapitoly v publikáciách ad 1/

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6) Kapitoly v publikáciách ad 2/

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7) Kapitoly v publikáciách ad 3/

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8) Kapitoly v publikáciách ad 4/

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16) Vydávané periodiká evidované v Current Contents

1. BEREK Dušan - guest editor špeciálneho čísla International Journal of Polymeric Materials
2. CHODÁK Ivan - guest editor špeciálneho čísla Polymer for Advanced Technologies
3. OMASTOVÁ Mária - guest editor špeciálneho čísla Polymer Engineering and Science

17) Ostatné vydávané periodiká

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18) Vydané alebo editované zborníky z vedeckých podujatí

1. **1st Bratislava Young Polymer Scientists Workshop BYPOS,** Workshop Book, August 20-23, 2007, Bratislava – Congress Center Smolenice, Slovak Republic. Ed. Young Scientists Council of Polymer Institute of the Slovak Academy of Sciences, Bratislava, 2007. 93 p. ISBN 978-80-968433-4-3

2. **Chemické Listy,** Abstract Book of International Conference Polymeric Materials in Automotive & 19th Slovak Rubber Conference, May 15-17, 2007, Bratislava, Slovak Republic. Ed. Mária Omastová, Bratislava, 2007. Vol. 101, no. Symposia S, (2007), ISSN 0009-2770, 72 p.

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20) Vedecké práce uverejnené na internete

a/ v cudzom jazyku

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4. Vedecké recenzie, oponentúry

1. BARTOŠ Josef
- 1 recenzia článku pre časopis Physical Review E
- 1 recenzia článku pre časopis Macromolecules
- oponovanie (priebežné) MVTS grantu pre projekt SR-BRD kooperácie na r. 2007-2009 pre FCHPT STU

2. BENKOVÁ Zuzana
- 1 recenzia článku pre časopis International Journal of Quantum Chemistry
- 1 recenzia článku pre časopis Chemical Papers

3. BEREK Dušan
- guest editor špeciálneho čísla International Journal of Polymeric Materials
- 1 recenzia článku pre časopis Analytical Chemistry
- 3 recenzie článkov pre časopis Macromolecules
- 3 recenzie článkov pre časopis Journal of Chromatography A
- 1 recenzia článku pre časopis Journal of Chromatography A
- 2 recenzie článkov pre časopis Journal of Separation Sciences
- 2 recenzie článkov pre časopis Colloids and Surfaces A
- 3 recenzie článkov pre časopis European Polymer Journal
- oponovanie troch grantových projektov GA VEGA a GA AVČR
- oponovanie troch grantových projektov IUPAC
- oponovanie Application for Professorship, pre Brooklyn Polytechnic, USA

4. BLEHA Tomáš
- 1 recenzia článku pre časopis Polymer
- 1 recenzia článku pre časopis Polymer for Advanced Technologies
- 1 recenzia článku pre časopis Chemical Engineering Science
- 1 recenzia článku pre časopis Colloids and Surfaces

5. CAPEK Ignác
- 1 recenzia článku pre časopis Surface and Coatings Technology
- 1 recenzia článku pre časopis Macromolecular Materials and Engineering
- 2 recenzie článkov pre časopis Journal of Colloid and Interface Science
- 1 recenzia článku pre časopis Colloids and Surfaces, Physicochemical and Engineering Aspects

6. CIFRA Peter
- 1 recenzia článku pre časopis Macromolecules
- 1 recenzia článku pre časopis Macromolecular Theory and Simulationse
- 3 recenzie článkov pre časopis Journal of Physical Chemistry

7. DANKO Martin
- 2 recenzie článkov pre časopis Journal of Applied Polymer Science
- 2 recenzie článkov pre časopis E-polymers
- 1 recenzia článku pre časopis Polymer for Advanced Technologies

8. HRDLOVIČ Pavol
- oponovanie jedného grantového projektu VEGA
- oponovanie dvoch projektov APVV

9. CHMELA Štefan
- 1 recenzia článku pre časopis Polymer Degradation and Stability
- 1 recenzia článku pre časopis Journal of Macromolecular Science
- oponovanie jedného grantového projektu VEGA

10. CHODÁK Ivan
- guess editor špeciálneho čísla Polymer for Advanced Technologies
- 1 recenzia článku pre časopis Journal of Thermoplastic Composite Materials
- 1 recenzia článku pre časopis Polymer Degradation and Stability
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- 1 recenzia článku pre časopis Composites Science and Technology
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- oponovanie deviatich grantových projektov APVV január 2007 – 4ô november 2007 – 5)

11. KÓSA Csaba
- 2 recenzie článkov pre časopis Journal of Applied Polymer Science

12. KRONEK Juraj
- 2 recenzie článkov pre časopis Journal of Applied Polymer Science

13. KRUPA Igor
- 2 recenzie článkov pre časopis European Polymer Journal

14. LACÍK Igor
- 2 recenzie článkov pre časopis Macromolecular Chemistry and Physics
- 1 recenzia článku pre časopis Macromolecules

- 1 recenzia článku pre časopis Polymer
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15. LATH Dieter
- 1 recenzia článku pre časopis Macromolecular Chemistry and Physics
- 1 recenzia článku pre časopis Farmaceutický obzor

16. OMASTOVÁ Mária
- 3 recenzie článku pre časopis Synthetic Metals
- 1 recenzia článku pre časopis Journal of Applied Polymer Science
- 1 recenzia článku pre časopis Polymer Degradation and Stability
- 1 recenzia článku pre časopis Polymer International
- 1 recenzia článku pre časopis Polymer Engineering and Sciences
- oponovanie jedného grantového projektu VEGA
- oponovanie jedného grantového projektu APVV
- oponovanie jedného grantového projektu Grantovej agentúry ČR
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17. MOSNÁČEK Jaroslav
- 2 recenzie článkov pre časopis Polymer
- 1 recenzia článku pre časopis Dyes and Pigments

18. NOVÁK Igor
- 1 recenzia článku pre časopis Journal of Applied Polymer Science
- 1 recenzia článku pre časopis European Polymer Journal
- 1 recenzia článku pre časopis Polymer Engineering and Science
- 1 recenzia článku pre časopis Macromolecular Chemistry and Physics
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- 2 recenzie článkov pre časopis Macromolecular Materials and Engineering
- oponovanie jedného grantového projektu Grantovej agentúry ČR
- oponovanie jedného grantového projektu VEGA
- oponovanie piatich grantových projektov APVV
- oponovanie projektu aplikačného výskumu MŠ č. 4/0003/05
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19. ŠPITALSKÝ Zdeno
- 2 recenzie článkov pre časopis Advanced Composites Letters
- 1 recenzia článku pre časopis Journal of Nanostructured Polymers and Nanocomposites

20. RYCHLÁ Lyda
- 1 recenziea článku pre časopis Polymer Degradation and Stability

21. RYCHLÝ Jozef
- 3 recenzie článkov pre časopis Polymer Degradation and Stability
- oponovanie dvoch grantových projektu APVV

5. Ohlasy – citácie WOS + SCOPUS

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Príloha č. 4

Údaje o pedagogickej činnosti pracoviska

BEREK Dušan
- Kvapalinová chromatografia polymérov, 1/0 týždenne, 12 hodín prednášok za letný semester, Katedra analytickej chémie, Prírodovedecká fakulta UK, Bratislava
- Kvapalinová chromatografia polymérov (Liquid chromatography of synthetic polymers) - deväť krátkych kurzov v zahraničí (3x USA – Arligton/Dallas/, Memphis a Webster, 1x Nemecko - Bayreuth, 1x Francúzsko - Marseille, 2x Brazília – Buzios a Rio de Janeiro, 2x Kananda – Montral a Vancouver) – celkove 29 hodín

BLEHA Tomáš
- Koloidná chémia, 2/0 týždenne, 26 hodín prednášok za zimný semester, Katedra fyzikálnej chémie, FCHPT STU, Bratislava

CAPEK Ignác
- Technológia prípravy materiálov, makromolekulových látok a kompozitných materiálov, 6/0 hodín týždenne, 120 hodín prednášok, za zimný a letný semester, Fakulta priemyselných technológií, Trenčianska univerzita A. Dubčeka, Trenčín

CIFRA Peter
- Makromolekulová chémia, 2/0 týždenne, 26 hod. prednášok za zimný semester 2005, 4-5 ročník, Prírodovedecká fakulta UK, Bratislava

CHODÁK Ivan
- Fyzika polymérov, 3/0 hodiny týždenne, 36 hodín prednášok za semester, Fakulta priemyselných technológií, Trenčianska univerzita, Púchov
- Fyzika polymérov a papiera, 2/2 hodiny týždenne, 24 hodín prednášok a 24 hodín cvičení IV. Ročník Katedra plastov a kaučuku a Katedra dreva, papiera a celulózy, FCHPT STU, Bratislava
- Fyzika polymérov a papiera, 2/1 hodiny týždenne, 24 hodín prednášok a 12 hodín cvičení II. Ročník medziodborové štúdium Plasty v strojárenstve FCHPT a StrojF STU, Bratislava

NOVÁK Igor
- Lepenie kovov, 6 hodín prednášok, Materiálovo-technologická fakulta STU, Trnava

Príloha č. 5

Údaje o medzinárodnej vedeckej spolupráci

Vyslanie vedeckých pracovníkov do zahraničia na základe dohôd:

Krajina	*Druh dohody*					
	MAD, KD, VTS		*Medziústavná*		*Ostatné*	
	Meno pracovníka	*Počet dní*	*Meno pracovníka*	*Počet dní*	*Meno pracovníka*	*Počet dní*
Španielsko	BARTOŠ J.	14				
Česká republika					BENKOVÁ Z.	68
Francúzsko	BEREK D.	14				
Brazília					BEREK D.	11
Kanada			BEREK D.	10		
Nemecko					BEREK D.	12
Rakúsko					BEREK D.	1
Taliansko	BEREK D.	17			BEREK D.	12
USA					BEREK D.	9
Česká republika					BLEHA T.	2
Luxemburgsko			CAPEK I.	4		
Nemecko			CAPEK I.	12, 12		
Rumunsko			CAPEK I.	3		
Nemecko			DANKO M.	6		
Poľsko			DANKO M.	6		
Česká republika					FLORIÁN Š.	1,1,4
Taliansko					FLORIÁN Š.	1
Grécko			HLOUŠKOVÁ Z.	5		
Česká republika					HRDLOVIČ P.	1
Francúzsko					HUSÁR B.	15
Francúzsko					CHMELA Š.	15
Česká republika					CHODÁK I.	1
Rakúsko					CHODÁK I.	4
Izrael			CHORVÁT D.	4		
Kanada			CHORVÁT D.	18		
Nemecko			CHORVÁT D.	2		
Česká republika	JANIGOVÁ I.	12			JANIGOVÁ I.	2
Česká republika					JURČÁK D.	2
Holandsko					JURČÁK D.	6
Rumunsko					JURČÁK D.	5
Nemecko			KASÁK P.	6		
Rakúsko					KOLLÁR J.	194

Portugalsko					KOLLÁRIKOVÁ G.	4
Izrael			KRONEKOVÁ Z.	4		
Taliansko			KRONEKOVÁ Z.	4		
Nemecko			KRONEK J.	19		
Poľsko	KRONEK J.	8				
Izrael			KRUPA I.	4		
Nemecko			KRUPA I.	10		
Španielsko			KRUPA I.	40		
Izrael			LACÍK I.	4		
Nemecko			LACÍK I.	3,2,7,2		
Nórsko			LACÍK I.	5		
Rakúsko					LACÍK I.	1
Švajčiarsko					LACÍK I.	2
Taliansko			LACÍK I.	4		
Česká republika					LATH D.	1
Česká republika			MIČUŠÍK M.	3		
Nemecko			MIČUŠÍK M.	14		
Holandsko					MIKOVÁ G.	365
USA					MOSNÁČEK J.	92
Francúzsko			MRAVČÁKOVÁ K.	30		
Nemecko			NEDELČEV T.	4, 8, 6		
Španielsko			NEDELČEV T.	8		
Česká republika					NOVÁK I.	1,1,4, 4,1
Česká republika			OMASTOVÁ M.	4		
Grécko			OMASTOVÁ M.	5		
Taliansko			OMASTOVÁ M.	8		
Maďarsko	OMASTOVÁ M.	10				
Nemecko			OMASTOVÁ M.	6, 10		
Rakúsko					OMASTOVÁ M.	2
Česká republika					PALENČÁR P.	1, 3
Lichtenstein					PAVLINEC J.	3
Česká republika			PODHRADSKÁ S.	3		
Španielsko					RAČKO D.	87
Česká republika					RYCHLÁ L.	1
Česká republika					RYCHLÝ J.	1, 1
Poľsko					RYCHLÝ J.	2
Rakúsko					RYCHLÝ J.	1
Rumunsko					RYCHLÝ J.	5
Slovinsko					RYCHLÝ J.	1
Turecko			RYCHLÝ J.	7, 7		

Nemecko			STACH M.	2, 2		
Grécko					ŠPITALSKÝ Z.	334
Česká republika	ŠTEVIAR M.	7				7
Počet vyslaní spolu	**7**	**82**	**42**	**323**	**45**	**1285**

Prijatie vedeckých pracovníkov zo zahraničia na základe dohôd:

Krajina	*Druh dohody*					
	MAD, KD, VTS		*Medziústavná*		*Ostatné*	
	Meno pracovníka	*Počet dní*	*Meno pracovníka*	*Počet dní*	*Meno pracovníka*	*Počet dní*
Nemecko			BEHNEL N.	4		
Taliansko			BERGOMETTI M.	2		
Nemecko			BUBACK M.	3		
Turecko					CECEN V.	185
Francúzsko			CHEHIMI M.	3		
Taliansko	CORRADINI D.	8				
Taliansko			DINI M.	2		
Poľsko	DUDA A.	5				
Ukrajina	DUDARENKO G.	30				
Rusko	EĽJAŠEVIČ G. K.	7				
Nemecko			FÖRSTER T.	4		
Izrael			GREENBERG K.	3		
Nemecko	HAUSSLER L.	4				
Česká republika	HROMÁDKOVÁ J.	5				
Poľsko	JOMRÓZ-PIEGZA M.	4				
Česká republika					KELNAR I.	1
Česká republika					LAPČÍK L.	1
Poľsko	LIBERA M.	4				
Poľsko	LIBISZOWSKI J.	5				
Česká republika			LOPATIN A.	4		
JAR.			LUYT A.S.	30		
Izrael			MICHAELI S.	3		
Česká republika					MILICHOVSKÝ	**1**
JAR			MOLEFI J.	30		
Izrael			MOTRO B.	3		
Česká republika			MOUČKA R.	4		
Česká republika	NETOPÍLIK M.	**5**				
Turecko			ÓKSŰZ U.	5		
Rusko					OLIFERENKO A.	5
Izrael			OVED R.	3		
Taliansko			PAOLINI E.	2		
Poľsko	PIEZGA M. J.	**4**				
Nemecko	PIONTECK J.	**7**				

Česká republika					RAAB M.	1
Taliansko			RANABOLDO L.	2		
Taliansko			RICCI R.	2		
Taliansko			ROCCO C.	2		
Česká republika			SAHA N.	3		
Belgicko					SAMPERS J.	2
Nemecko	SCHULZE U.	4				
Česká republika	STEJSKAL J.	10				
Nemecko			STROHHÖFER M.	4		
Bulharsko	STOYANOVA J. G.	19				
Nemecko			STUMBER M.	4,5		
Česká republika					ŠPÍRKOVÁ M.	**1**
Turecko			TANIS F.	5		
Česká republika	TRCHOVÁ M.	4				
Taipei	TSIANG R. Ch.	7				
Česká republika					VÁCLAVKOVÁ T.	30
Argentína	VEGA G.	10				
USA					VOGL O.	1
Pol'sko	WEDA P.	4				
Rumunsko					ZAHARESCU T.	5
Počet prijatí spolu	**19**	**146**	**23**	**132**	**11**	**233**

Účasť pracovníkov pracoviska na konferenciách v zahraničí:

Krajina	***Názov konferencie***	***Meno pracovníka***	***Počet dní***
Nemecko	Mainz Materials Simulation Days 2007	BENKOVÁ Zuzana	**6**
Brazília	POLYCHAR	BEREK Dušan	**8**
Holandsko	3rd International Symposium on Separation and Characterization of Natural and Synthetic Macromolecules	BEREK Dušan	**4**
Kanada	WSEAS Mathematics in Chemistry and Biology	BEREK Dušan	**3**
Mad'arsko	7th Balaton Symposium on High-Performance Separation Methods	BEREK Dušan	**4**
USA	PITTCOM Conference & Expo	BEREK Dušan	**7**
Nemecko	Mainz Materials Simulation Days 2007	BLEHA Tomáš	**6**
Slovinsko	European Polymer Congress 2007	BLEHA Tomáš	**6**
Česká republika	Modeling of Polymers Materials	CIFRA Peter	**4**
Nemecko	Mainz Materials Simulation Days 2007	CIFRA Peter	**6**
Slovinsko	European Polymer Congress 2007	DANKO Martin	**9**
Česká republika	APROCHEM 2007 IRS 2007 CHISA 2007	FLORIÁN Štěpán	**3** **3** **5**
Francúzsko	42eme Colloque du Groupe Français de Rhéologie	HUSÁR Branislav	**3**
Slovinsko	European Polymer Congress 2007	HUSÁR Branislav	**6**
Slovinsko	European Polymer Congress 2007	CHMELA Štefan	**8**

Maďarsko	Eurofillers 2007	CHODÁK Ivan	**5**
Nemecko	Polymer Fracture	CHODÁK Ivan	**4**
Taliansko	Biodegradable Polymeric Foams	CHODÁK Ivan	**8**
USA	Computers in Cardiology 2007 Optics East 2007	CHORVÁTH Dušan	**4** **4**
Egypt	9th Arab International Conference on Polymer Science and Technology	JANIGOVÁ Ivica	**6**
Slovinsko	European Polymer Congress 2007	JANIGOVÁ Ivica	**10**
Maďarsko	Eurofillers 2007	KOLLÁR Jozef	**5**
Slovinsko	European Polymer Congress 2007	KOLLÁR Jozef	**9**
Nemecko	REACT 2007 - 3rd International Symposium on Reactive Polymers in Inhomogeneous Systems, in Melts, and at Interfaces	KRONEK Juraj	**4**
Francúzsko	26th Workshop of the AIDPIT	KRONEKOVÁ Zuzana	**4**
Maďarsko	Eurofillers 2007	KRUPA Igor	**5**
Nemecko	REACT 2007 - 3rd International Symposium on Reactive Polymers in Inhomogeneous Systems, in Melts, and at Interfaces	KRUPA Igor	**4**
Slovinsko	European Polymer Congress 2007	KRUPA Igor	**10**
Francúzsko	26th Workshop of the AIDPIT	LACÍK Igor	**4**
Poľsko	2nd European Conference Chemistry for Life Sciences	LACÍK Igor	**5**
Nemecko	XXIII International Conference on Photochemistry	LUKÁČ Ivan	**6**
Nemecko	REACT 2007 - 3rd International Symposium on Reactive Polymers in Inhomogeneous Systems, in Melts, and at Interfaces	LUSTOŇ Jozef	**4**
Slovinsko	European Polymer Congress 2007	MOSNÁČEK Jaroslav	**9**
Slovinsko	European Polymer Congress 2007	MOŠKOVÁ Daniela	**10**
Francúzsko	XIVth International Sol-Gel Conference	NEDELČEV Tomáš	**6**
Slovinsko	European Polymer Congress 2007	NEDELČEV Tomáš	**9**
Česká republika	APROCHEM 2007 IRS 2007 CHISA 2007	NOVÁK Igor	**3** **3** **5**
Maďarsko	Eurofillers 2007	OMASTOVÁ Mária	**5**
Slovinsko	European Polymer Congress 2007	OMASTOVÁ Mária	**10**
Slovinsko	European Polymer Congress 2007	PAVLINEC Juraj	**8**
Poľsko	YES 2007	RAČKO Dušan	**6**
Egypt	9th Arab International Conference on Polymer Science and Technology	RYCHLÁ Lyda	**6**
Poľsko	EWS Symposium	RYCHLÁ Lyda	**4**
Veľká Británia	PDDG Meeting	RYCHLÁ Lyda	**6**
USA	233rd ACS Meeting	RYCHLÁ Lyda	**5**
Poľsko	EWS Symposium	RYCHLÝ Jozef	**4**
Slovinsko	European Polymer Congress 2007	RYCHLÝ Jozef	**8**
Veľká Británia	PDDG Meeting	RYCHLÝ Jozef	**6**
USA	233rd ACS Meeting	RYCHLÝ Jozef	**5**