

**ANNUAL REPORT
2002**

DEPARTMENT
OF FIBRES AND TEXTILE CHEMISTRY

FACULTY of CHEMICAL and FOOD TECHNOLOGY

SLOVAK UNIVERSITY OF TECHNOLOGY in BRATISLAVA

Radlinského 9

8 1 2 3 7 BRATISLAVA

Slovak Republic

Telephone: 0421 - 2 - 52968598
Fax: 0421 - 2 - 52493198

DEPARTMENT OF FIBRES AND TEXTILE CHEMISTRY

Head of the Department:

Prof. Anton Marcinčin, PhD

E-mail: tmarcin@chtf.stuba.sk

Telephone: ++421-2-529685598

Fax: ++421-2-524931198

I. STAFF

Full Professor:

Eberhard Borsig, PhD, DSc; Anton Marcinčin, PhD

Associate Professors:

Michal Krištofič, PhD;

Assistant Professors:

Jaroslav Legéň, PhD; Anna Ujhelyiová, PhD;

Research Fellows:

Eva Bolhová; Ľubica Fleischmannová; Marcela Hricová; Anna Murárová, PhD; Elena Zemanová, PhD;

PhD Students:

Martina Jurenková; Natália Karabcová; Eva Körmendyová; Zita Mlynarčíková;

Technical Staff:

Daniela Dančová; Gabriel Kužel; Jarmila Nemčeková; Albína Pokorná; Edita Štábelová;

II. TEACHING AND RESEARCH LABORATORIES

A. Teaching Laboratories:

Laboratory of Macromolecular Chemistry

Laboratory for Computer Modeling of Structure and Properties of Polymers

Laboratory of Polymer Fibre and Fibrous Material Structure (DSC, TMA, Surface Properties)

Laboratory of Fibre Technology

Laboratory of Textile Chemistry, Bleaching, Dyeing and Finishing

Laboratory of Fibre and Textile Testing

Laboratory for fibre spinning, drawing and texturing, extruders 16 and 30 mm

Laboratory for dyeing and finishing of fibres and textile materials (Ahiba, Pretema, Multicolor)

B. Research Laboratories:

Laboratory for thermal and electrical properties of fibres and textiles (DTA DSC 7, TGA 7-Perkin Elmer, Derivatograph Q 1500 D, integral electrometer Polystat PS-1, Alambeta)

Laboratory for thermomechanical properties (TMA - 50 M and TA)

Laboratory for mechanical properties (Instron, model 1112)

Laboratory of rheological properties (Dynamic viscoelastomer model Rheo-200, capillary rheometer, extrusimeter GÖTTTFERT ϕ 20mm)

Laboratory for structural properties (Microscope Olympus model BHT, Xenotest, SALS)

Laboratory for exhaust dyeing process and its evaluation (Ahiba, Pretema,)

Laboratory for spinning of fibres (extruders, ϕ 16 mm and 30 mm respectively)

III. TEACHING

A. Undergraduate Study

5th Semester (autumn)		
Macromolecular Chemistry	(2-0 h)	Borsig
6th Semester (spring)		
Technology of Materials	(2-0 h)	Marcinčin
Bachelor Project	(0-0-4 h)	
7th Semester (autumn)		
a) compulsory subjects:		
Macromolecular Chemistry II	(2-1 h)	Borsig
Physics of Polymers and Paper	(2-2 h)	Krištofič
Fiber Sci. and Technology	(2-2 h)	Marcinčin, Legéň
Laboratory of Fiber Sci. and Technology	(0-0-8 h)	Krištofič, Karabcová
b) optional subjects:		
Structure of Fibrous Materials	(1-1 h)	Krištofič, Ujhelyiová,
Modelling of Polymer Structure and Properties	(1-1 h)	Marcinčin, Rychlý,
8th Semester (spring)		
a) compulsory subjects:		
Colorants and Textile Auxiliaries	(2-0 h)	Murárová, Ujhelyiová
Technical Textiles	(2-0 h)	Krištofič, Borsig
Principles of Textile Engineering	(2-0 h)	Ujhelyiová, Murárová
Laboratory of Textile Engineering	(0-0-8 h)	Legéň, Mlynarčíková
b) optional subject:		
Physiology and Comfort of Clothing	(0-2 h)	Murárová, Hricová
Special Chemical Treatment of Textiles	(0-2 h)	Borsig, Hricová
9th Semester (autumn)		
Textile Chemistry and Technology	(2-2 h)	Ujhelyiová, Bolhová
Technology of Polym. Films	(2-0 h)	Marcinčin, Krištofič
Laboratory of Textile Chemistry and Technology	(0-0-10 h)	Ujhelyiová, Bolhová
Fiber and Textile Testing	(2-0 h)	Legéň, Murárová
10th Semester (spring)		
Seminary	(0-3-0 h)	
Diploma Thesis	(0-0-27 h)	
B.PhD study:		
a) subjects:		
Physics of Polymers		Krištofič
Macromolecular Chemistry		Borsig
Technology of Polymeric Materials		Marcinčin
Organic Chemistry		

Physical Chemistry

b) Seminars

Study on the polish universities, M. Michalik, March, 20, 2002

Traditional composites and nanocomposites with matrix of polyolefine, Z. Mlynarčíková, May, 2nd, 2002

Modified polypropylene fibres dyeable by exhaust process, E. Bolhová, May, 17, 2002

Influence of fibre physical modification on the end-use and physiological properties, A. Murárová, PhD., May, 31st 2002

Chemical fibres modified by additives for new materials (in english) + Evaluation of dyed concentrates processability, Prof. A. Marcinčin, Nov. 11, 2002

Modification and processability of polyamides during preparation of fibres, N. Karabcová, Nov., 25, 2002

IV. CURRENT RESEARCH PROJECTS

A. Dispersion of organic pigments in synthetic polymers with particle size close to nano-scale (Anton Marcinčin), VEGA č. 1/8106/01

The dependance between filterability of pigmented dispersions (in model liquides) and some rheological parameters of these dispersions were found. Insufficient processability of pigmented dispersions (i.e. insufficient filterability) is primarily the consequence of the particles agglomeration not of their dimensions.

Relationships between filterability and rheological properties were applied to the evaluation of antibacterial additives dispersity in the model compounds.

New literature references from the domain of chemical fibres pigmentation in mass were gathered.

On the base of these studies the new type of antibacterial additive for polyamide fibres was developed.

B. Nanocomposite fibres based on synthetic polymers (Anton Marcinčin), APVT-20-010102

The first task of this project was a study of literature references focused to the choice of inorganic and organic fillers and pigments for preparation of fibre-forming polymer nanodispersions. To accomplish this aim we started from the actual level and future trends in domains of nanoscience, nanotechnologies and development of multifunctional materials worldwide and in Slovakia as well. Main goals were:

- composite fibres filled by inorganic nanoparticles
- pigmented chemical fibres on the level of nanocolorants
- composite fibres based on binary and ternary polymer blends with character of nanocomposite fibres.

C. Polymer composite fibres (Eberhard Borsig), VEGA č. 1/9147/02

The mechanism of polyethylene-PE crosslinking initiated with dicumyl peroxide-DCP in the presence of minority functional groups like double bonds of different kind has been studied. The minority double bonds are formed during the PE production, but also by the reaction of peroxide with PE. At the comparison of the crosslinking kinetics of the starting PE (i.e. PE with

original minority double bonds) with the same kind of PE, but with removed double bonds, it was found that in the first phase of reaction the crosslinking was about 20% slower than in the original-unmodified PE. It has been observed that the rate of DCP decomposition is not controlled by first order kinetics but it consists of the spontaneous and induced decomposition. Syndiotactic polypropylene was melt compounded with organic layered silicates which enables generation of anisotropic nanoparticles by means of in situ exfoliation. The obtained polypropylene nanocomposite materials was spun, and characterization of the fibers is under way.

V. COOPERATION

A. Cooperation in Slovakia:

Research Institute for Man-Made Fibres, Svit

Research Institute of Textile Chemistry, Žilina

Polymer Institute, Slovak Academy of Sciences, Bratislava

Slovenský hodváb a.s., Senica

Chemosvit a.s., Svit

Rhodia Industrial Yarn a.s., Humenné (Seminary: Structure, properties and processability of PA 66, Oct. 19.-20., 2002)

Nylstar a.s., Humenné

Merina a.s., Trenčín

Istrochem a.s., Bratislava

Slovena, Žilina

B. International Cooperation:

Technical University, Lodž, Poland

-Cooperation in the CEEPUS project

Technical University, Liberec, Czech Republic

-Exchange of staff members and students in the CEEPUS network

University of Maribor, Faculty of Mechanical Engineering, Maribor, Slovenia

-Cooperation in the CEEPUS project, exchange of students

University of Zagreb, Faculty of Textile Technology, Croatia

-Cooperation in the CEEPUS project, Organization of International Textile, Clothing and

Design Conference, Dubrovnik Croatia, Oct. 6.-9. 2002

Preparation of the World Textile Conference, 2nd AUTEX Conference: Textile

Engineering at the dawn of a new millenium: an exciting challenge, Brugges, Belgium, July 1.-3., 2002

C. Membership in Domestic Organizations and Societies:

VEGA Committee (A. Marcinčin)

Council of Ministry of Education SR State Program: "Development of young employees and PhD. students personality" (A. Marcinčin)

Managing Council of certification, VÚTCH Žilina (A. Marcinčin)

Chairman of Common branch council for awarding of DSc in 14-05-9 Macromolecular Chemistry (E. Borsig)

Chairman of Common branch council for awarding of PhD in 14-05-99 Macromolecular Chemistry (E. Borsig)
Chairman of the Slovak Chemical Society Section "Polymers" (E. Borsig)
Advisory Board SAV for Chemical sciences (E. Borsig)
Editorial Board of journal Vlákna a textil (Fibres and Textiles) (A. Marcinčin, M. Krištofič, A. Murárová, A. Ujhelyiová)
Slovak Society of Industrial Chemistry Board and its Executive Committee (A. Murárová)
Chairman of Slovak Society of Industrial Chemistry Section "Chemical Fibres" (A. Murárová)
Slovak Society of Industrial Chemistry (A. Marcinčin, M. Krištofič, J. Legěň, M. Hricová, A. Ujhelyiová, E. Zemanová)
Executive Editor of scientific journal Vlákna a textil (Fibres and Textiles), (M. Krištofič)
Co-editor of scientific journal Vlákna a textil (Fibres and Textiles) (A. Murárová)
Slovak Chemical Society, section "Textile, fibres and film materials", Bratislava (E. Borsig, M. Krištofič, A. Murárová, J. Legěň, A. Ujhelyiová, E. Zemanová)

D. Membership in International Organizations and Societies:

Association of Universities for Textiles (AUTEX), Gent, Belgium (A. Marcinčin)
Advisory Board of AUTEX Research Journal, Gent, Lodž, Belgium, Poland (A. Marcinčin)
Central European Conferences Committee (A. Marcinčin)
Scientific Council, Technical University of Liberec, Fac. of Textile, Czech Rep. (A. Marcinčin)
General Assembly of National Representatives of European Polymer Federation, Eindhoven, Netherlands (E. Borsig)
Editorial Board of Journal of Macromolecular Chemistry, Pure and Applied Chemistry, USA (E. Borsig)
Editorial Board of Chemické listy (Chemical Letters), Prague, Czech Rep. (E. Borsig)
Committee for Awarding of DSc for scientific branches 14-05-99 Macromolecular Chemistry and 28-03-99 Technology of Macromolecular Compounds Prague, Czech Rep. (E. Borsig)

F. International Scientific Program:

CEEPUS

SI-007 Development of the Smart Clothing

M. Krištofič, network is formed by:

Faculty of Mechanical Engineering, University of Maribor, Slovenia - coordinator

Faculty of Textile Technology, University of Zagreb, Croatia

Faculty of Textile, Technical University of Liberec, Czech Republic

Textile Faculty, Technical University of Łódź, Poland

Faculty of Mechanical Engineering, Technical University of Budapest, Hungary

Faculty of Mechanical Engineering, Technical College for Light Industry, Hungary

University of Hradec Králové, Czech Republic

January - December 2002

G. Visitors from Abroad:

Nagy Veronika, Budapest University of Technology and Economics (BUTE) Hungary, January 16 - February 8 (CEEPUS), 24 days

Maciej Michalik, Technical University of Lodž, March, 1 - 28, 2002 (CEEPUS), 29 days

H. Visits of Staff Members and PhD Students to Foreign Institutions:

E. Borsig, Albert-Ludwigs Universität Freiburg, March 2002, (Germany), 30 days

Visits of Students to Foreign Institutions:

Stroková, A. University of Maribor, Slovenia, (CEEPUS), April 2002, 1 month

Šalachová, K. University of Maribor, Slovenia, (CEEPUS), April 2002, 1 month

Vojtušová, A. TU Liberec, Czech Rep. (CEEPUS), April 2001, 1 month

VI. THESES AND DISSERTATIONS

A. Graduate Theses (MS Degree) for state examinations after five years of study (supervisors are written in brackets):

Bc. Belicová A.: Influence of cross section on the properties of blended fibres (Legéň J.)

Bc. Ďuričková T.: Evaluation of blended PP/PET fibres dyeing process by disperse dyestuffs (Ujhelyiová A.)

Bc. Ďurišová M.: Influence of molecular weight of PET on structure of PP/PET blend fibres (Marcinčin A.)

Bc. Fleischmannová L.: Preparation of PP nanocomposites fibres filled by inorganic nanofiller (Borsig E.)

Bc. Chromul'áková K.: PA6, copolyamides and their blends for fibres with improved properties (Krištofič M.)

Bc. Jurenková M.: Utilization of themomechanical analysis for evaluation of PP/PET fibres (Zemanová E.)

Bc. Náčiniaková Z.: Modified polypropylene fibres dyed by exhaust method (Krištofič M.)

Bc. Stroková A.: Influence of oligomeric additives on pigment dispersion in PET fibres (Marcinčin A.)

Bc. Šalachová K.: Physiological properties of textile (Murárová A.)

Bc. Vojtušová A.: Kinetics and fastness of dyeing of modified PP/PET fibres dyed by disperse dyestuffs (Ujhelyiová A.)

B.Dissertations (PhD):-

C.Dissertations (DSc):-

D.Habilitation Thesis: Murárová A.: Physical Modification of Fibres, Oct.8., 2002

VII. PUBLICATIONS

[1]* Greco R., Iavarone M., Fiedlerová A., Borsig E.: Optical properties of polyethylene-styrene-co-methacrylate copolymers IPN-like networks: Effect of different methacrylate styrene co monomers on properties. Journal of Materials Science 37, 3389-3395 (2002)

[2]* Lazár M., Hřková L., Borsig E.: Polymerization of n-dodecyl methacrylate into high conversion. J. Macromol. Sci. – Pure Appl. Chem. A 39 (5) 365377 (2002)

[3]* Marcinčin A.: Modification of Fiber-Forming Polymers by Additives, Progr. Polym. Sci. 27, 853-913 (2002)

[4]* Marcinčin A., Ujhelyiová A., Marcinčinová T.: Fibre-Forming Blend of Polyethylene

- and Polyethylene Terephthalate, Macromol. symp. 176, 65-72 (2001)
- [5]* Rätzsch M., Arnold E., Borsig E., Bucka H., Reichelt N.: Radical reactions on polypropylene in the solid state. *Progress in Polymer Science* 27 (7) 1195-1398 (2002)
- [6] Krištofič M., Karabcová N.: Copolyamides containing ring elements, *Vlákna a textil (Fibres and textiles)* 9(3) 88-91 (2002)
- [7] Marcinčin A., Ujhelyiová A., Zemanová E., Marcinčinová T.: Spracovateľnosť organických pigmentov pri pigmentácii syntetických vlákien v hmote, *Processing of organic pigments during pigmentation of synthetic fibres in mass (in Slovak) Vlákna a textil (Fibres and Textiles)* 8(4) 267-272 (2001)
- [8] Marcinčin A., Ujhelyiová A., Hricová M.: Processing of the organic pigment dispersion in polypropylene and polypropylene Fibres, *Vlákna a textil (Fibres and Textiles)* 9(1) 3-11 (2002)
- [9] Murárová A., Jambrich M., Murárová Z.: Fyziológia odievania III. Komfort nosenia, *Clothing Comfort (in Slovak) Vlákna a textil (Fibres and Textiles)* 8(4) 279-283 (2001)
- [10] Murárová A., Murárová Z.: Fyziológia odievania IV. Ekohumánne a fyziologické vlastnosti textílií, *Ecological and Hygiene Properties of Textiles, (in Slovak) Vlákna a textil (Fibres and Textiles)* 8(4) 284-286 (2001)
- [11] Krištofič M., Murárová A., Karabcová N.: Polyamide 6-copolyamide blended fibres, *Vlákna a textil (Fibres and Textiles)* 9 (4) 130 - 134 (2002)
- [12] Murárová A., Krištofič M., Jambrich M.: The influence of PET fibres cross-section geometry on dyeing, *Vlákna a textil (Fibres and Textiles)* 9 (4) 135 - 141 (2002)

B. Conferences (* International conferences)

- [1]* Hricová M., Marcinčin A.: Processing of the Antibacterial Additives for Synthetic Fibres. In: *Proceedings of the 1st International Textile, Clothing and Design Conference*, 71-75, Oct. 6.-9., 2002, Dubrovnik, Croatia, University of Zagreb,
- [2]* Gerald M., Hes L., Araújo M., Marcinčin A.: The Application of New High Performance Polypropylene Fibres in Functional Knit Structures. In: *Proceedings of the 1st International Textile, Clothing and Design Conference*, 59 - 64, Oct. 6. - 9. 2002, Dubrovnik, Croatia,
- [3]* Marcinčin A., Ujhelyiová A., Hricová M.: Chemical Fibres Modified by Additives for New Textile Materials. In: *Proceedings of the 1st International Textile, Clothing and Design Conference*, 82 - 88, Oct. 6. -9. 2002, Dubrovnik, Croatia, 2002
- [4]* Sfiligoj Smole M., Ujhelyiová A.: Influence of Thermal Treatment on Structure of Poly(ethylene Terephthalate) Fibres. In: *Conference Program and Extended Abstract, Polymer Fibres 2002*, July 10.-12. 2002, Manchester, UK, The Manchester Conference Centre, UMIST
- [5]* Ujhelyiová A., Marcinčin A.: Morphology and Properties of Blend PP/PET Fibres. In: *Proceedings of the 1st International Textile, Clothing and Design Conference*, 127 - 129, Oct. 6.-9. 2002. Dubrovnik, Croatia,
- [6]* Borsig E., Pavliková S., Thomann R., Reichert P., Mülhaupt R., Fiedlerová A., Marcinčin A., Ujhelyiová A.: Fibre Spinning from Poly(Propylene) Organoclay Nanocomposite. In: *Internationale Fachtagung „Polymerwerkstoffe 2002*, 332 - 335, Sept. 25.-27., Halle, Deutschland,

- [7]* Borsig E.: Polypropylene Grafting as a Tool of New Material Preparation. In: International symposium "Makromolekules in 21st Century", Oct. 7.-9. 2002, Wien, Austria
- [8]* Hrdlovič P., Danko M., Borsig E.: Spectral characteristics of complex polymer structures by free and linked fluorescence probes In: Internationale symposium "Macromolekules in 21st Century", 30, Oct. 7.-9., 2002 Wien, Austria
- [9]* Krištofič M., Karabcová N.: Modification of PA6 fibres by ternary copolyamides. In: 6th Dresden Textile Conference 2002, p. 173, June 19.-20.. 2002, Dresden, SRN,
- [10]* Marcinčin A., Šesták, J.: Permanent Antimicrobial Modification of Chemical Fibres. In: 6th Dresden Textile Conference 2002, p.136-138, June, 19.-20. 2002 Dresden, SRN,
- [11]* Borsig E., Fiedlerová A., Greco R., Marcinčin A., Schulze V., Pionteck J.: Transparent IPN-like system, its structure and properties. In: 7th European Symposium "Polymer Blends", D 16, May 27.- 29. 2002, Lyon-Villeurbanne France,
- [12] Jambrich M., Hudák J., Jambrich P., Mokráňová B., Murárová A., Vojtko M., Revús M.: Vlastnosti textílií z PP vlákien pre aplikáciu riešenia EKO problémov. Properties of textiles from PP fibres for solution of EKO problems, (in Slovak) In: Chemprogress 2002, June, 20. 2002, p. 35-39, Púchov, SR

C. Books and Textbooks:

D. Patents:

Kišš M., Ďuriš L., Marcinčin A.: Polyolefinické koncentráty modifikované nukleačnými činidlami. Polyolefine concentrates modified by nucleated compounds (in Slovak), PÚV 182 – 2002 úžitkový vzor 3409, October 2002