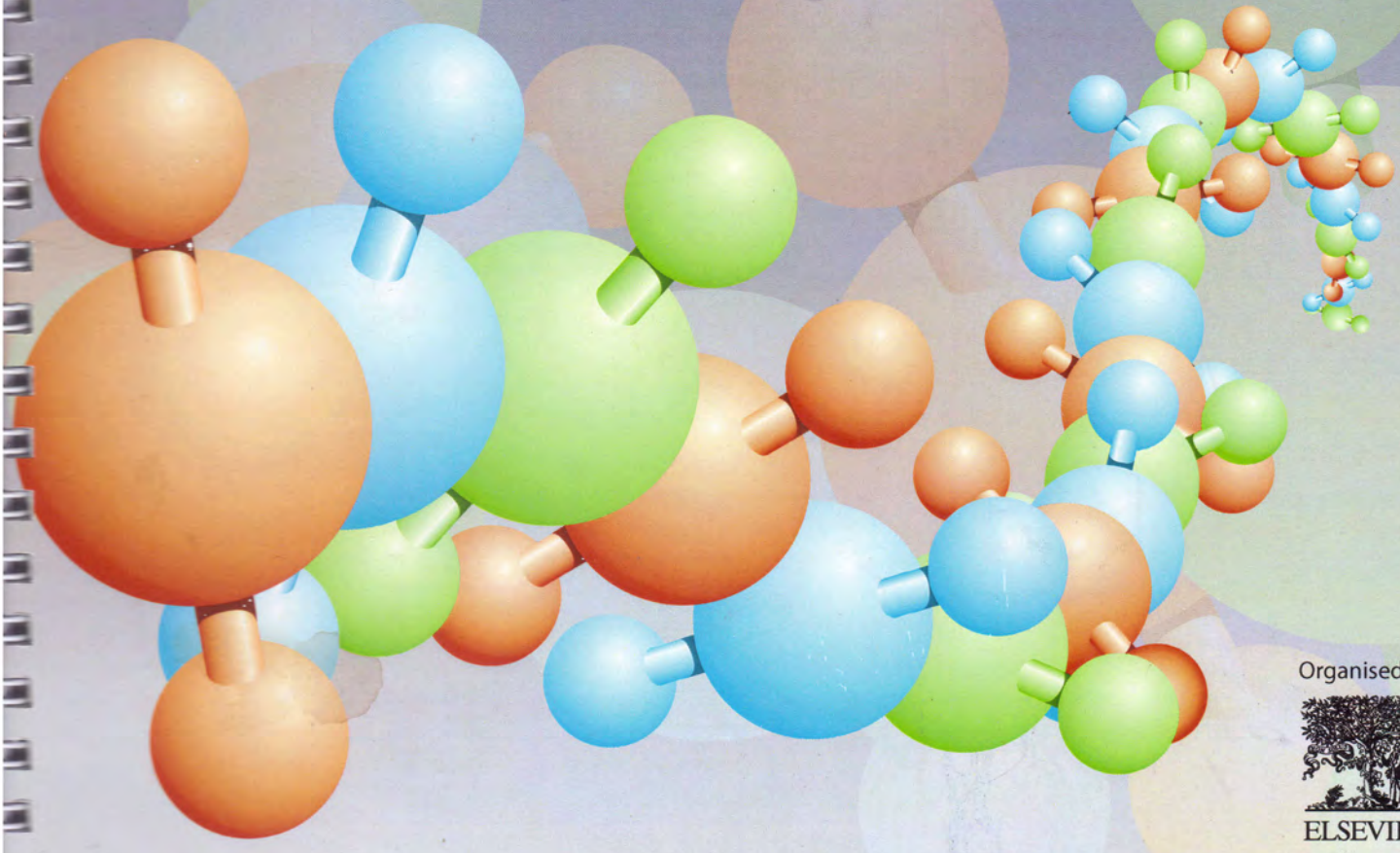
Third International Symposium

Frontiers in polymer science

In association with the journal polymer

21-23 May 2013, Sitges (near Barcelona), Spain



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Programme Booklet

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P3.68	**Polymeric hydrogel thin films as multifunctional reservoir for biomedical applications** U. Jonas[1,2], V. Schwartz*[1], A. Mateescu[2], U. Ritz[3], A. Brunsen[4], [1]*University of Siegen, Germany,* [2]*FORTH, Greece,* [3]*Johannes Gutenberg University Mainz, Germany,* [4]*TU, Germany*
P3.69	**Double-derivatized dendrimer as P-glycoprotein inhibitor and tight junction modulator for oral drug delivery** Y. Liu*[1], N.C.G. Chiu[1], [1]*National University of Singapore, Singapore*
P3.70	**Improved thermal and photochemical stability of polyfluorenes in a thermoplastic polymeric matrices** F.J. Payá-Nohales[1], R. Vázquez-Guilló*[2], R. Mallavia[2], F. Arán-Ais[1], [1]*INESCOP, Spain,* [2]*Universidad Miguel Hernández, Spain*
P3.71	**The influence of cadmium chloride over the morphology and properties of polyaniline obtained through a direct synthesis path** V. Musat[1], M. Popa*[1], C.S. Stan[1], [1]*"Gheorghe Asachi" Technical University of Iasi, Romania*
P3.72	**Synthesis and characterization of monolithic columns for high performance liquid chromatography** M. Maciejewska*[1], M. Grochowicz[1], J. Osypiuk-Tomasik[1], [1]*Maria Curie Sklodowska University, Poland*
P3.73	**Surface modification of reactive polymers with functional metal nanoparticles** J. Bastos-Arrieta*[1], D. Muraviev[1], M. Muñoz[1], P. Ruiz[2], [1]*Universitat Autònoma de Barcelona, Spain,* [2]*MATGAS Research Center, Spain*
P3.74	**An "in vitro" experimental model to assess long-term performance of macroporous scaffolds implanted in soft or hard tissues** L. Vikingsson*[1], C.M. Antolinos-Turpín[1], J.A. Panadero[1,2], V. Sencadas[2], S. Lanceros-Méndez[2,3], G. Gallego Ferrer[1,4], [1]*Universitat Politècnica de València, Spain,* [2]*Campus de Gualtar, Portugal,* [3]*INL, Portugal,* [4]*Ciber en Bioingeniería, Portugal*
P3.75	**Preparation, characterization and study of asphalt ligand modified with thermoplastic polymers** L. Horst[1], R.G. Sousa[1], M.E.S.R. Silva[1], R.F.S. Freitas*[1], [1]*Federal University of Minas Gerais, Brazil*
P3.76	**Study of syntheses parameters of poly(n-isopropylacrylamide) temperature sensitive polymer gel** J.F.S. Filho[1], R.G. Sousa[1], M.E.S.R. Silva[1], R.F.S. Freitas*[1], [1]*Federal University of Minas Gerais, Brazil*
P3.77	**Tannic acid crosslinked chitosan/poly(vynil alcohol) hydrogels for entrapping drug loaded liposomes** B.C. Ciobanu[1,2], A.N. Cadinoiu (Jatariu)[1], C.A. Peptu[1], J. Desbrières[1,2], M. Popa*[1], [1]*"Gheorghe Asachi" Technical University of Iasi, Romania,* [2]*Université de Pau et des Pays de l'Adour, France*
P3.78	**Chitosan based in situ gel forming azithromycin loaded nanocomposite** D. Manikandan*[1], M.J. Nanjan[1], [1]*JSS, India*
P3.79	**The topographically changes in polyelectrolyte multilayer during swelling** M. Zerball*[1], R. von Klitzing[1], [1]*TU Berlin, Germany*
P3.80	**Correlating the thermophysical and molecular properties of 19th century chrome yellow oil paints** A.M. Ramos*[1], D. Sanches[1], M.J. Melo[1], L. Carlyle[1], J.F.J. Coelho[2], C.S.M.F. Costa[2], [1]*Universidade Nova de Lisboa, Portugal,* [2]*Universidade de Coimbra, Portugal*
P3.81	**Surface modification of hydroxyapatite with thermo-responsive polymer brushes via ATRP** B. Wlodarczyk*[1], J. Pietrasik[1], M. Zaborski[1], [1]*Lodz University of Technology, Poland*
P3.82	**Toughening of wheat gluten biopolymer with epoxidized natural rubber** S. Hemsri*[1], C. Tongpin[1], P. Somkid[1], A. Playkaew[1], S. Saearma[1], [1]*Silpakorn University, Thailand*
P3.83	**Self-standing protein-polymer functional hybrid films showing unusual spreading behavior** K.P. Sharma*[1], A.W. Perriman[1], S. Mann[1], [1]*University of Bristol, UK*
P3.84	**Multipurpose backbone for the synthesis of antifouling polymers** A.S. Serrano*[1,2], S.Z. Zürcher[1,2], S.T. Tosatti[1,2], N.D.S. Spencer[1], [1]*ETH Zürich, Switzerland,* [2]*SuSoS AG, Switzerland*

Programme Overview	
Tuesday 21 May 2013	
11:00	Registration */Hall Auditorium*
14:00-14:20	Opening Remarks by Chairs and Rumen Duhlev, *Elsevier, Oxford, UK*
14:20-15:10	**[K01] Frontiers in precision polymer synthesis by precision radical polymerization** Mitsuo Sawamoto, *Kyoto University, Japan*
15:10-16:00	**[K02] Crystallization-driven self-assembly of elongated block copolymer micelles** Mitchell A. Winnik, *University of Toronto, Canada*
16:00-17:30	Coffee break and Poster Session 1
17:30-18:20	**[K03] New paradigms at the proto-life/synthetic biology interface** Stephen Mann, *University of Bristol, UK*
18:20-19:10	**[K04] Polymer Nano-Assemblies for Targeted Bioresponsive Cancer Delivery** Paula T. Hammond, *Massachusetts Institute of Technology, Cambridge, USA*
19:10-21:00	Welcome reception and continuation of Poster Session 1 */Hall Auditorium*
Wednesday 22 May 2013	
09:00-09:50	**[K05] Structural control from molecular up to macroscopic size regimes for developing functional soft materials** Takuzo Aida, *The University of Tokyo, Japan*
09:50-10:40	**[K06] Using polymers to direct the growth and assembly of gold nanoparticles** Luis M. Liz-Marzán, *CIC biomaGUNE, San Sebastián, Spain*
10:40-12:10	Coffee break and Poster Session 2 */Hall Auditorium*
12:10-13:00	**[K07] Molecular engineering of folded nano-architectures** Ivan Huc, *Université de Bordeaux, France*
13:00-14:30	Lunch */Tamuntana*
14:30-15:20	**[K08] Bio-inspired polymer chemistry** Roeland J.M. Nolte, *Radbout University, Nijmegen, The Netherlands*
15:20-16:10	**[K09] Supramolecular polymerization driven by host-enhanced noncovalent interactions** Xi Zhang, *Tsinghua University, Beijing, China*
16:10-16:30	Coffee break */Hall Auditorium*
16:30-17:20	**[K10] Self-assemblies of giant molecular shape amphiphiles as a new platform for engineering structures at different feature sizes** Stephen Z.D. Cheng, *The University of Akron, USA*
17:20-18:10	**[K11] The perfect mix: making nanoparticles that like polymers** Stephan Förster, *University of Bayreuth, Germany*
18:10-20:00	Reception and Continuation of Poster Session 2 */Hall Auditorium*
Thursday 23 May 2013	
08:30-09:20	**[K12] Capsules from films and films with capsules for controlled and remote release in biosciences** Helmuth Möhwald, *Max Planck Institute of Colloids and Interfaces, Potsdam, Germany*
09:20-10:10	**[K13] Water and Ion Transport in Polymer Membranes for Water Purification Applications** Benny D. Freeman, *The University of Texas, Austin, USA*
10:10-11:40	Coffee break and Poster Session 3 */Hall Auditorium*
11:40-12:30	**[K14] Design and Preparation of Polymer Architectures with Self-Assembling Morphologies and Their Biological Activity** Julio San Román, *CSIC, and CIBER-BBN, Madrid, Spain*
12:30-14:45	Lunch and continuation of Poster Session 3*/Tamuntana*
14:45-15:35	**[K15] Functional Hybrid Nanomaterials from Block Copolymers** Ulrich Wiesner, *Cornell University, Ithaca, USA*
15:35-15:50	Closing Remarks, Rumen Duhlev, *Elsevier, Oxford, UK*

The influence of cadmium chloride over the morphology and properties of polyaniline obtained through a direct synthesis path

V. Musat, M. Popa*, C.S. Stan

"Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, Department of Natural and Synthetic Polymers, 73 Prof. dr. docent Dimitrie Mangeron, 700050, Iasi, Romania, marpopa2001@yahoo.fr

Introduction

The development of smart materials based on polymers represents a scientific and technological challenge. Such "intelligence" is expressed by the ability of a polymer to modify its properties such as permeability, color, transparency, conductivity and many others as a function of the properties of its environment.

Polyaniline (PANI) is one of the most studied polymers. This interest is surely linked to its intrinsic electrical conductivity, but also to its capacity to modify the conductivity accompanied by color change on function to pH of the medium and/or the presence of oxidants or reducers.

The properties like structure, surface morphology, electrical conductivity and air stability of the polymers depend upon the nature and extent of doping.

Experimental part

Conductive, doped polyaniline was synthesized by the chemical oxidation of aniline, in acidic aqueous medium, containing cadmium chloride and ammonium persulfate (APS) as oxidant.

This new used synthesis route has as result the obtaining of polyaniline with special features.

The aniline polymerization was carried out at three different temperatures, at 0, 20 and 40°C, varying the concentration of $CdCl_2$.

The obtained polymers are separated by filtration through paper filters and washed for several times with aqueous acidified solutions using the synthesis acids.

The wet powder of PANI was dried onto a glass support at 60°C.

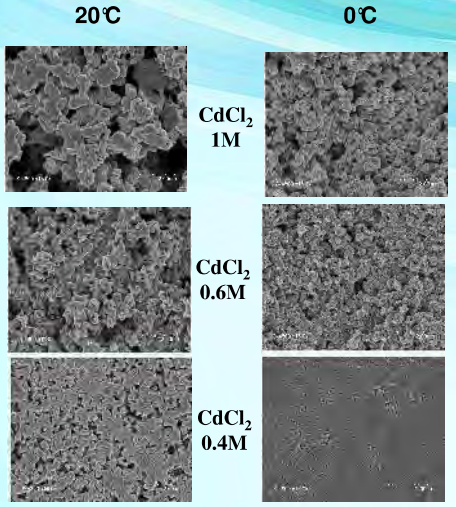
The addition of salt ions serves two roles:

- **doping of the polymer chains**, → conversion of the insulating polymer form to the conductive form.
- to **induce a specific morphology of a film**.

Results and Discussions

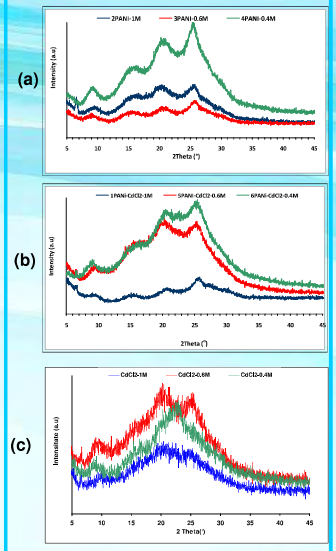
The influence of $CdCl_2$ added in the synthesis medium over the morphology and properties of polyaniline was investigated through FT-IR, X-ray diffraction, SEM and dielectric spectroscopy.

Scanning electron microscopy



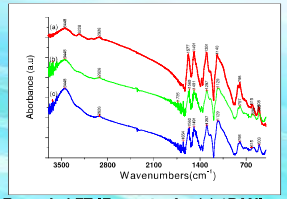
SEM images recorded of the PANI obtained at 20 and 0°C and in the presence of $CdCl_2$: 1M, 0.6M, 0.4M.

Powder X-ray diffraction



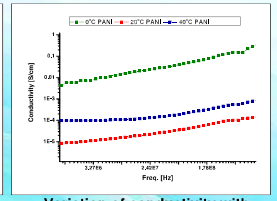
Recorded diffractograms for the PANI obtained in the presence of $CdCl_2$ at (a) 0°C, (b) 20°C, (c) 40°C.

FT-IR analysis



Recorded FT-IR spectra for (a) 1PANI 1M $CdCl_2$ (b) 3PANI 0.6M $CdCl_2$ (c) 4PANI 0.4M $CdCl_2$

Dielectric analysis



Variation of conductivity with frequency for PANI obtained in the presence of $CdCl_2$ at 0, 20, 40°C.

Conclusions

- The X-ray powder diffraction patterns for all prepared polyaniline samples are typical for semicrystalline polymers.
- The morphology and crystallinity of product are dependent on the temperature and concentration of cadmium salt. The polyaniline salt (emeraldine) synthesized at 0°C was found to be more crystalline than that synthesized at 20 and 40°C and also lower temperatures tend to favour a more compact granular structure.
- Data recorded through FT-IR analysis revealed minimal differences between samples prepared in various conditions, all recorded spectra being specific to emeraldine form of polyaniline.
- The frequency dependence of the conductivity in the 1-1000MHz range was found to be insignificant in case of polyaniline sample prepared by the conventional synthesis path, while in case of doped polyaniline prepared with the highest $CdCl_2$ concentration at 0°C, the conductivity is significantly increased in the 80-800Mhz range.

Acknowledgements

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