



Autoritatea contractanta:
*Unitatea Executiva pentru Finantarea Invatamantului
Superior si a Cercetarii Stiintifice Universitare*

Cercetari avansate privitoare la comportarea polimerilor sub actiunea factorilor de mediu

*Program IDEI-Proiect de cercetare exploratorie
Contract nr. PN-II-ID-PCE-2011-3-0187*



Contractor:
Institutul de Chimie Macromoleculara "Petru Poni" Iasi

Durata proiect: 2011 – 2014



ECHIPA PROIECTULUI

Director proiect:

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Membrii echipei de cercetare:

- ☐ Dr. Liliana Rosu
- ☐ Dr. Carmen-Alice Teaca
- ☐ Dr. Ruxanda Bodirlau
- ☐ Drd. Cristian-Dragos Varganici
- ☐ Drd. Oana Maria Paduraru
- ☐ Drd. Manuela Tatiana Nistor



OBIECTIVE

In prezentul proiect sunt urmarite transformările suferite de către polimeri cu diferite structuri sub acțiunea principalilor factori agresivi din mediul inconjurător și sub acțiunea luminii în special.

In realizarea acestui obiectiv general se iau în considerare următoarele obiective specifice:

- imobilizarea pe polimeri naturali și/sau sintetici de coloranți cu diferite structuri și în diferite concentrații
- realizarea de sisteme polimerice multicomponente conținând polizaharide
- obținere de rețele polimerice interpenetrate pe baza de collagen sau poli(acid aspartic)
- studiul acțiunii factorilor de mediu (lumina, căldura, umiditate asupra polimerilor colorați)
- studiul stabilității sistemelor multicomponente la acțiunea factorilor de mediu



Directii de cercetare

Obiectivele prezentate se vor orienta spre urmatoarele directii:

- Cunoasterea implicarii unor coloranti reactivi imobilizati pe polimeri si determinarea efectelor biologice in corelatie cu proprietatile fizico-chimice
- Caracterizarea si evaluarea stabilitatii la conditiile de mediu a sistemelor polimere multicomponente continand polizaharide
- Studiul polimerilor naturali sub actiunea radiatiilor UV



BUGETUL PROIECTULUI

Etapă 2011: 120.000 lei

Etapă 2012: 500.000 lei

Etapă 2013: 450.000 lei

Etapă 2014: 350.000 lei

Buget total: 1.420.000 lei



Etapele proiectului

Etapă 2011

Obiective:

- Analiza comparativa a stadiului actual privind comportarea polimerilor sub actiunea factorilor de mediu
- Documentare in domeniul tehnicilor si metodelor instrumentale moderne



Rezultate 2011

Pe baza rezultatelor obtinute in cadrul etapei 2011, urmatoarele lucrari au fost prezentate la manifestari stiintifice:

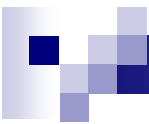
1. R.Bodirlau, C.-A.Teaca, D.Rosu, L.Rosu; Photo-degradation behaviour of wood after coating with epoxidized soybean oil; Zilele Universitatii „Al. I. Cuza”, Iasi, 28-29 oct. 2011
2. O.M.Paduraru, N.Tudorachi, A.Chiriac; Thermal analysis of new hydrogels based on natural and synthetic polymers; Zilele Universitatii „Al. I. Cuza”, Iasi, 28-29 oct. 2011
3. L.Rosu, D.Rosu, C.-D. Varganici; The thermal behaviour of some semi-interpenetrated polymer networks based on epoxy resin and aromatic polyurethane; Zilele Universitatii „Al. I. Cuza”, Iasi, 28-29 oct. 2011
4. D.Rosu, L.Rosu, F.Mustata; Effect of UV radiation on some semi-intepenetrated polymer networks based on epoxy-resin and polyurethane; Zilele Universitatii „Al. I. Cuza”, Iasi, 28-29 oct. 2011



Etapă 2012

Obiective:

- Obținerea de sisteme polimerice multicomponente
- Caracterizarea sistemelor polimerice sintetizate și stabilirea relațiilor structura-proprietati



Lucrari stiintifice: 9

1. C.-D.Varganici, A.Durdureanu-Angheluta, D.Rosu, M.Pinteala, B.C.Simionescu; Thermal degradation of magnetite nanoparticles with hydrophilic shell; *J. Anal. Appl. Pyrol.* **96**, 63–68 (2012)
2. D.Rosu, L.Rosu, F.Mustata, C.-D.Varganici; Effect of UV radiation on some semi-interpenetrating polymer networks based on polyurethane and epoxy resin; *Polym. Degrad. Stab.* **97** 1261–1269 (2012)
3. O.M.Paduraru, D.Ciolacu, R.N.Darie, C.Vasile; Synthesis and characterization of polyvinyl alcohol/cellulose cryogels and their testing as carriers for a bioactive component; *Materials Science and Engineering C.* **32**, 2508–2515 (2012)
4. C.-D.Varganici, O.Ursache, C.Gaina, V.Gaina, B.C.Simionescu; Studies on new hybrid materials prepared by both Diels-Alder and Michael addition reactions; *J Therm Anal Calorim.* <http://dx.doi.org/10.1007/s10973-012-2532-y>
5. S.F.Patachia, M.-T.Nistor, C.Vasile; Thermal behavior of some wood species treated with ionic liquid; *Industrial Crops and Products*, Available online 29 Oct <http://dx.doi.org/10.1016/j.indcrop.2012.10.003>
6. D.Rosu, L.Rosu, C.-D.Varganici; The thermal stability of some semi-interpenetrated polymer networks based on epoxy resin and aromatic polyurethane; *J. Anal. Appl. Pyrol*, 2012, *submission needing revision 1*
7. C.-A.Teaca, D.Rosu, R.Bodirlau, L.Rosu; Structural changes in wood under artificial UV light irradiation determined by FTIR spectroscopy and color measurements – A BRIEF REVIEW; *BioResources*, 2012, *submission needing revision 1*
8. O.Ursache, C.Gaina, V.Gaina, C.-D.Varganici; New hybrid materials obtained by Diels-Alder and Michael addition reactions. A comparative study; *Polym. Bull.*, 2012, *submitted*
9. M.-T.Nistor, C.Vasile; TG/FT-IR/MS study on the influence of nanoparticles content on the thermal decomposition of the starch/poly(vinyl alcohol) montmorillonite nanocomposites; *Iranian Polymer Journal*, 2012, *submitted*



Lucrari publicate in extenso in volume (10) si prezentate la manifestari stiintifice (comunicari: 11 si postere: 16)

COFrRoCA – 2012, Septième Colloque Franco-Roumain de Chimie Appliquée, 27 – 29 Juin 2012, Bacau, Roumanie:

1. D.Rosu, L.Rosu, C.-D.Varganici; Le comportement photochimique et thermique des systèmes polymérique multicomposant; Proceedings Colloque ISSN: 2068-6382, pg.123-124 (**COMUNICARE**)
2. C.-D.Varganici, O.Ursache, C.Gaina, V.Gaina, B.C.Simionescu; Nouveau matériaux hybride autorenewable thermique. Etudes thermiques; Proceedings Colloque ISSN: 2068-6382, pg.129-130 (**COMUNICARE**)
3. L.Rosu, C.C.Gavat, D.Rosu; Decoloration degradation des textiles colores en presence des rayonnement ultraviolets; Proceedings Colloque ISSN: 2068-6382, pg.149-150 (**POSTER**)
4. C.-A.Teaca, R.Bodirlau, L. osu, D.Rosu; FTIR analyse thermiques des bois resineux apres modification et traitement avec l'huile de soja epoxydee; Proceedings Colloque ISSN: 2068-6382, pg. 153-154 (**POSTER**)
5. M.T.Nistor, L.E.Nita, A.P.Chiriac, C.vasile, R.Darie; Conception des structures polymeres sensibles avec proprietes controlees. L'influence de l'agent de reticulation; Proceedings Colloque ISSN: 2068-6382, pg. 145-146 (**POSTER si premiu pentru cel mai bun poster**)

Lucrari publicate in extenso in volume (10) si prezentate la manifestari stiintifice (comunicari: 11 si postere: 16)

7th MoDeSt Conference, 2 - 6 Sept., 2012, Prague, Czech Republic, Abstract book, published by the Institute of Macromolecular Chemistry, Academy of Sciences of the Czech Republic, Prague 6 – Břevnov, Czech Republic

6. D.Rosu, C.-D.Varganici, L.Rosu; Thermal decomposition study of some polymeric multicomponent systems based on aromatic polyurethane and epoxy resin network; ISBN 978-80-85009-74-3, pg. 222-223 (**COMUNICARE**)

7. L.Rosu, F. Mustata, D.Rosu, C.-D.Varganici; Semi-interpenetrating polymer networks polyurethane-epoxy resin. Study of photochemical stability; ISBN 978-80-85009-74-3, pg. 278-279 (**POSTER**)

8. C.-D.Varganici, A.Durdureanu-Angheluta, D.Rosu, M.Pinteala, B.C.Simionescu, Thermal stability of core-shell hydrophilic nanoparticles for biomedicine; ISBN 978-80-85009-74-3, pg. 290-291 (**POSTER**)

9. R.Bodirlau, C.-A.Teaca; Obtainment and characterization of organic acid modified starch/plasticized corn starch composite films; ISBN 978-80-85009-74-3, pg.369-370 (**POSTER**)

10. C.-A.Teaca, R.Bodirlau, D.Rosu; Characterization of irradiated wood after chemical modification with organic anhydride and coating with epoxidized vegetable oil; ISBN 978-80-85009-74-3, pg. 374-375 (**POSTER**)

Lucrari publicate in extenso in volume (10) si prezentate la manifestari stiintifice (comunicari: 11 si postere: 16)

21st Symposium on Thermal Analysis and Calorimetry, 17 Feb. 2012, Bucuresti, Romania

11. C.-D.Varganici, O.Ursache, C.Gaina, V.Gaina, B.C.Simionescu; DSC studies on thermoreversible and non-thermoreversible hybrid materials (**COMUNICARE**)
12. S.Patachia, M.T.Nistor, C.Vasile; Thermal behavior of wood treated with ionic liquid (**COMUNICARE**)

Fifth Cristofor I. Simionescu Symposium "Frontiers in Macromolecular and Supramolecular Science", 11 – 13 Iunie 2012, Bucuresti, Romania

13. C.-D.Varganici, A.Durdureanu-Angheluta, F.Doroftei, D.Rosu, M.Pinteala, B.C. Simionescu; Core-shell magnetic nanoparticles based on silane compounds and magnetite: Thermal behavior (**COMUNICARE**)

2eme Colloque Franco-Roumain de Chimie Medicinale, CoFrRoCM 2012, Iasi, Romania, Oct. 3-5, 2012

14. O.M.Paduraru, A.Bosinceanu, G.Tantaru, C. Vasile; Effect of cyclodextrin on the solubility of an anti-arrhythmic drug (**POSTER**)

Zilele Universitatii "Alexandru Ioan Cuza" Conferinta Facultatii de Chimie, 25-27 Oct. 2012, Iasi, Romania

15. M.-T.Nistor, C.Vasile; Influence of nanoparticles on the thermal decomposition of hybrid nanocomposites based on starch/poly(vinyl alcohol) montmorillonite (**COMUNICARE**)



Lucrari publicate in extenso in volume (10) si prezentate la manifestari stiintifice (comunicari: 11 si postere: 16)

A XXXII-a Conferinta Nationala de Chimie, Calimanesti-Caciulata, Valcea, Romania, 03-05 octombrie 2012

16. C.-D.Varganici, D.Rosu, L.Rosu; The effect of temperature on the thermal stability of some semi-interpenetrated polymer networks based on epoxy resin and aromatic polyurethane (**COMUNICARE**)

17. D.Rosu, L.Rosu, C.-D.Varganici; Photooxidation behavior of some polyurethane based semi-interpenetrated polymer networks (**POSTER**)

18. C.-A.Teaca, R.Bodirlau, L.Rosu, D.Rosu, C.-D.Varganici; Wood treatment with organic anhydride and epoxidized vegetable oil – thermal properties investigation (**POSTER**)

19. L.Rosu, D.Rosu, C.C.Gavat; Effect of radiation UV on textile dyeing (**POSTER**)

20. F.Mustața, I.Bicu, L.Rosu; Formaldehyde resins from hydroxyl esters of resin acids (**POSTER**)

21. F.Mustata, I. Bicu, D.Rosu; Thermoseting resins obtained via sequential photo and thermal crosslinking of epoxy resins. Curing kinetics, thermal properties and morphology (**POSTER**)



Lucrari publicate in extenso in volume (10) si prezentate la manifestari stiintifice (comunicari: 11 si postere: 16)

Seminar analiza termica: Caracterizarea materialelor cu ajutorul tehnicilor de analiza termica, Iasi, Romania, 24 mai 2012

22. O.M.Paduraru, N.Tudorachi, A.Chiriac; Thermal degradation of carboxymethyl starch-g-poly(lactic acid) copolymer by TG-FTIR-MS analysis (**COMUNICARE**)

23. C.-D.Varganici, L.Rosu, M.Pinteala, D.Rosu, B.C.Simionescu; Thermal analysis application to some polymeric material micro- and nanoparticles (**COMUNICARE**)

15th International Conference Polymeric Materials, Halle, Germany, Sept. 12-14, 2012

24. O.M. Paduraru, D. Ciolacu, C. Vasile; Polyvinylalcohol/cellulose hydrogels as carriers for a bioactive component (**COMUNICARE**)

25. O.M.Paduraru, G.Tantaru, C.Vasile; Water soluble complex of hydroxypropyl- β -cyclodextrin and aminodarone (**POSTER**)

4th Bilateral Symposium on Functional Heterocyclic and Heterochain Polymers for Advanced Materials, Iasi, Romania, Sept. 2-7, 2012

26. O.M.Paduraru, C.Vasile, D.Ciolacu, R.N.Darie; Evaluation of polyvinylalcohol /cellulose hydrogels as carriers for drug delivery (**POSTER**)