

OVERALL REPORT SUMMARY

Project duration: *October 2015 – September 2017*

Project title: “**Polymer-based materials as sorbents for the enhanced removal of oil spills and dyes from the contaminated waters**”

Project code: **PN-II-RU-TE-2014-4-1266**; Acronym: **POLYSORB**; Contract: no. **95 / 01.10.2015**

© *Project POLYSORB, implemented at: Petru Poni Institute of Macromolecular Chemistry, Iasi, Romania*

Summary

One of the main objective of this project (POLYSORB) was to build and consolidate a young research team comprising the following members: dr. **Corneliu Cojocaru** (project manager), dr. **Petrisor Samoilă** (postdoc), dr. **Petronela Pascariu Dorneanu** (postdoc); **Razvan Rotaru** (research assistant); **Andra Cristina Humelnicu** (research assistant). The objective of the team was to bring original contributions for increasing the visibility of Romanian research via articles published in the international journal (ISI-indexed). In the frame of POLYSORB project, our team developed two main research directions: (1) design and development of the porous and hydrophobic polymer-based sorbents for the efficient oil spill cleanup, and (2) preparation of new polymeric/ferrites composite materials as magnetic sorbents for the enhanced removal of dyes from contaminated waters.

The scientific results developed in the frame of this project were disseminated via published (accepted/submitted) papers in the international journals as well as via presentations at the international conferences. Overview of results dissemination is summarized in the following.

Articles published (accepted or submitted) in the international journals (ISI)

- [1] Corneliu Cojocaru, Lucia Pricop, Petrisor Samoila, Razvan Rotaru, Valeria Harabagiu, *Surface hydrophobization of polyester fibers with poly(methylhydro-dimethyl)siloxane copolymers: Experimental design for testing of modified nonwoven materials as oil spill sorbents* *Polymer Testing* 59 (2017) 377-389; (Impact Factor, IF=2.464)
<https://doi.org/10.1016/j.polymertesting.2017.02.024>
<http://www.sciencedirect.com/science/article/pii/S0142941817300223>
- [2] Corneliu Cojocaru, Petronela Pascariu Dorneanu, Anton Airinei, Neculae Olaru, Petrisor Samoila, Aurelian Rotaru, *Design and evaluation of electrospun polysulfone fibers and polysulfone/NiFe₂O₄ nanostructured composite as sorbents for oil spill cleanup*, *Journal of the Taiwan Institute of Chemical Engineers* 70 (2017) 267-281 (IF=4.217)
<https://doi.org/10.1016/j.jtice.2016.11.005>
<http://www.sciencedirect.com/science/article/pii/S1876107016304552>
- [3] Petrisor Samoila, Corneliu Cojocaru, Liviu Sacarescu, Petronela Pascariu Dorneanu, Andrei-Adrian Domocos, Aurelian Rotaru, *Remarkable catalytic properties of rare-earth doped nickel ferrites synthesized by sol-gel auto-combustion with maleic acid as fuel for CWPO of dyes*, *Applied Catalysis B: Environmental* 202 (2017) 21-32 (IF=9.446)
<http://dx.doi.org/10.1016/j.apcatb.2016.09.012>
<http://www.sciencedirect.com/science/article/pii/S0926337316306932>
- [4] Petronela Pascariu Dorneanu, Corneliu Cojocaru, Niculae Olaru, Petrisor Samoila, Anton Airinei, Liviu Sacarescu, *Electrospun PVDF fibers and a novel PVDF/CoFe₂O₄ fibrous composite as nanostructured sorbent materials for oil spill cleanup*, *Applied Surface Science* 424 (2017) 389-396 (IF=3.387).
<https://doi.org/10.1016/j.apsusc.2017.01.177>
<http://www.sciencedirect.com/science/article/pii/S0169433217301988>
- [5] Petronela Pascariu Dorneanu, Anton Airinei, Niculae Olaru, Nicusor Fifere, Corneliu Doroftei, Felicia Iacom, *Preparation and characterization of some electrospun polysulfone nanocomposites reinforced with Ni doped SnO₂ nanoparticles*, *European Polymer Journal* 91 (2017) 326–336 (IF=3.531); <https://doi.org/10.1016/j.eurpolymj.2017.04.004>
<http://www.sciencedirect.com/science/article/pii/S0014305717300769>
- [6] Maria Ignat, Razvan Rotaru, Petrisor Samoila, Liviu Sacarescu, Daniel Timpu, Valeria Harabagiu, *Relationship between the components synthesis order of zinc ferrite-titania nanocomposites and their performances as visible-light-driven photocatalysts for relevant organic pollutant degradation*, (accepted manuscript, *In press* / 10.11.2016): *Comptes Rendus Chimie*
<https://doi.org/10.1016/j.crci.2016.11.004>
<http://www.sciencedirect.com/science/article/pii/S1631074816302879>
- [7] Petronela Pascariu Dorneanu, Corneliu Cojocaru, Petrisor Samoila, Niculae Olaru, Anton Airinei, Aurelian Rotaru, *Novel fibrous composites based on electrospun PSF and PVDF ultrathin fibers reinforced with inorganic nanoparticles: Evaluation as oil spill sorbents*, *Submitted manuscript* (21.08.2017) to the journal: *Materials Research Bulletin*; MS. Ref. No.: **MRB_2017_2931**
web: <https://www.journals.elsevier.com/materials-research-bulletin>

[8] **Petronela Pascariu Dorneanu**, Niculae Olaru, **Corneliu Cojocaru**, Anton Airinei, *Visible light-driven photocatalytical activity of ZnO-SnO₂ ceramic nanofibers for R6G dye degradation: Experimental design, modeling and process optimization*, **Submitted manuscript** (19.01.2017) to the journal: **Materials Chemistry and Physics**; MS. Ref. No.: **MATCHEMPHYS-D-17-00191**
web: <https://www.journals.elsevier.com/materials-chemistry-and-physics/>

[9] **Corneliu Cojocaru**, **Andra-Cristina Humelnicu**, **Petrisor Samoila**, **Petronela Pascariu Dorneanu**, Valeria Harabagiu, *Experimental design for the formulation and optimization of alginate/NiFe₂O₄ composite as magnetic adsorbent for cationic dye removal*, **Submitted manuscript** (28.01.2017) to the journal: **Journal of Industrial and Engineering Chemistry**; MS. Ref. No.: **JIEC-D-17-00229**
<https://www.journals.elsevier.com/journal-of-industrial-and-engineering-chemistry>

[10] **Andra-Cristina Humelnicu**, **Corneliu Cojocaru**, **Petronela Pascariu-Dorneanu**, **Petrisor Samoila**, Valeria Harabagiu, *Novel chitosan functionalized samarium doped cobalt ferrite for adsorptive removal of anionic dye from aqueous solutions*, **Submitted manuscript** (10.07.2017) to the journal: **Comptes Rendus Chimie**; MS. Ref. No.: **CRCHIMIE-S-17-00397**
<https://www.journals.elsevier.com/comptes-rendus-chimie>

NATIONAL PATENT REQUEST

Authors: Corneliu Cojocaru, Petrisor Samoila, Razvan Rotaru, Petronela Pascariu,
Title: PILLOW TYPE SORBENT FOR COMBATING OIL SPILL POLLUTION AND THE METHOD OF PREPARATION,
National Patent Request: at OSIM (Bucharest, Romania),
Patent Req. No. (OSIM): A/00483 (18-07-2017).

Presentations at International Conferences

1) **Andra-Cristina Humelnicu**, **Corneliu Cojocaru**, **Petrisor Samoila**, **Petronela Pascariu Dorneanu**, Valeria Harabagiu, "Alginate / spinel ferrite composite as magnetic adsorbent for environmental applications", (oral communication OC 8); *12th International Conference on Colloid and Surface Chemistry, ICCSC'2016*, May 16-18, 2016; ICMPP, Iasi, Romania;
Book of Abstracts, pg.35.

web: <https://iccsc2016.wordpress.com/program/>
https://iccsc2016.files.wordpress.com/2016/01/program-iccsc12_20162.pdf
<https://iccsc2016.files.wordpress.com/2016/01/book-of-abstracts.pdf>

2) **Razvan Rotaru**, **Petrisor Samoila**, **Corneliu Cojocaru**, **Petronela Pascariu Dorneanu**, Liviu Sacarescu, Valeria Harabagiu, "Fast removal of amaranth dye from wastewaters using cobalt ferrite", (poster presentation P 22); *12th International Conference on Colloid and Surface Chemistry, ICCSC'2016*, May 16-18, 2016; ICMPP, Iasi, Romania;
Book of Abstracts, pg.73.

Web: <https://iccsc2016.wordpress.com/program/>
https://iccsc2016.files.wordpress.com/2016/01/program-iccsc12_20162.pdf
<https://iccsc2016.files.wordpress.com/2016/01/book-of-abstracts.pdf>

3) **Petronela Pascariu Dorneanu, Corneliu Cojocaru**, Nicolae Olaru, **Petrisor Samoila**, Anton Airinei, Liviu Sacarescu, "Evaluation of electrospun PVDF fibers and PVDF/CoFe₂O₄ fibrous composite as oil spill sorbents", (poster presentation T3-P10); *11th International Conference On Physics Of Advanced Materials (ICPAM-11)*, Septemeber 8-14, 2016, Babes-Bolyai University of Cluj-Napoca, Romania; Daily Program and Abstracts, pg. 290-292.

Web: <https://www.icpam.ro/icpam-programme/>
<https://icpam.ro/files/posters-session3.pdf>
<https://www.icpam.ro/files/BoA-ICPAM11.pdf>

4) **Petronela Pascariu Dorneanu, Nicolae Olaru, Corneliu Cojocaru**, Anton Airinei, "Optimization of the photocatalytic activity for electrospun ZnO-SnO₂ ceramic nanofibers", (poster presentation T3-P5); *11th International Conference On Physics Of Advanced Materials (ICPAM-11)*, Septemeber 8-14, 2016, Babes-Bolyai University of Cluj-Napoca, Romania; Daily Program and Abstracts, pg. 76-78.

Web: <https://www.icpam.ro/icpam-programme/>
<https://icpam.ro/files/posters-session1.pdf>
<https://www.icpam.ro/files/BoA-ICPAM11.pdf>

5) **Corneliu Cojocaru**, "Molecular modeling of methylene blue dye and its binding ability to human serum albumin: autodock study" (poster presentation P1); *8th International Conference on Molecular Modeling in Chemistry and Biochemistry - MolMod 2016*, November 13-15, 2016, Babes-Bolyai University of Cluj-Napoca, Romania; Book of Abstracts, pg.40.

Web: http://chem.ubbcluj.ro/molmod/assets/docs/MolMod_prog_2016_Oct31.pdf
http://chem.ubbcluj.ro/molmod/assets/docs/BoA_2016.pdf

6) **Corneliu Cojocaru**, Lucia Pricop, **Petrisor Samoila, Razvan Rotaru**, Valeria Harabagiu, "Polymeric Fibrous Nonwovens as Sorbent Materials for Oil Spill Cleanup ", (oral communication); *6th International Conference on ECOLOGICAL & ENVIRONMENTAL CHEMISTRY (EEC-2017)*, March 2-3, 2017; ASM, Chisinau, Republic of Moldova; Book of Abstracts, pg.102; Section B: Environmental Chemistry and Engineering

Web: <http://eec-2017.mrda.md/>; http://eec-2017.mrda.md/?page_id=148&topic=B

7) Bogdan Condurache, **Razvan Rotaru, Corneliu Cojocaru, Petronela Pascariu Dorneanu, Petrisor Samoila**, Valeria Harabagiu, „Polymeric and Peat-based materials as efficient sorbents for combating oil spill pollution” (poster), *12th International Symposium - Present Environment & Sustainable Development (PESD-2017)*, 2-4 June, "A.I. Cuza" University, Iasi, Romania.

web: <http://pesd.ro/Symposium%20Information.html>
http://pesd.ro/Symposium%20site/2017/PESD_2017-%20PROGR%20FINAL%202.pdf

8) **Corneliu Cojocaru, Petronela Pascariu Dorneanu, Petrisor Samoila**, Lucia Pricop, Liviu Sacarescu, „Evaluation of Polymer-based Fibrous Materials as Oil Pill Sorbents: Experimental Design, Modeling and Optimization”, (Oral presentation), *9th Cristofor I. Simionescu SYMPOSIUM, Frontier in Macromolecular and Supramolecular Science*, 13-14 June 2017, "Petru Poni" Institute of Macromolecular Chemistry, Iasi, Romania.

web: <http://www.icmpp.ro/events/conferences/nineth.html>
<http://www.icmpp.ro/events/conferences/nineth/Program%20CIS%202017.pdf>

9) **Andra Cristina Humelnicu, Corneliu Cojocaru, Petronela Pascariu Dorneanu, Petrisor Samoila**, Valeria Harabagiu, „Removal of Anionic Dye by Novel Chitosan Functionalized Samarium Doped Cobalt Ferrite”, (Oral presentation), *9th Cristofor I. Simionescu SYMPOSIUM, Frontier in Macromolecular and Supramolecular Science*, 13-14 June 2017, "Petru Poni" Institute of Macromolecular Chemistry, Iasi, Romania.

web: <http://www.icmpp.ro/events/conferences/nineth.html>

<http://www.icmpp.ro/events/conferences/nineth/Program%20CIS%202017.pdf>

10) **Petronela Pascariu Dorneanu, Corneliu Cojocaru, Petrisor Samoila**, Anton Airinei, “Electrospinning of polysulfone fibers and polysulfone/NiFe₂O₄ fibrous composite: application as efficient oil spill sorbents”, (Poster presentation), *The 9th International Conference on Advanced Materials (ROCAM 2017)*, 11-14 July, Bucharest, Romania; Book of Abstracts pg.103; Section-S4: Advanced Materials for Energy and Environmental Applications.

web: <http://rocam.unibuc.ro/rocam2017/Sections/index1.php>

11) **Petronela Pascariu Dorneanu**, "Photocatalytic metal-oxide nanofibers fabricated by electrospinning" (oral presentation/invited) , The 2nd International Workshop Advances On Photocatalysis (AdvPhotoCat-E 2017); 14 –16 July (2017), Technological Educational Institute (TEI), Heraklion-Crete, Greece. Book of Abstracta, pg.10;

Links: <http://www.photocatalysis-workshop.com/>

<http://www.photocatalysis-workshop.com/wp-content/uploads/2015/03/Program-final-version-AdvPhotoCat2017-formatA5.pdf>