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Departamentul de Fizica si Chimie

Raport de autoevaluare

al activitatii desfasurate in ultimii 5 ani in vederea obtinerii gradatiei de merit

I. Activitate didactica si activitatea in scoala doctorala

- Eleborarea cursului de **Tehnici de Rezonanta Magnetica Nucleara pentru Ingineri** (adresat studentilor doctoranzi) (Exista carte publicata online http://utclujnmr.weebly.com/publications.html
- Elaborarea cursurilor si seminariilor de fizica pentru studenţii Facultatii de Electronica si Telecomunicatii –in limba **engleza.**
- Elaborarea cursurilor si seminariilor de fizica pentru studenţii Facultatii de Constructii de Masini –in limba **engleza** si limba **germana**.
- Pregatirea referatelor de laborator si a seminariilor de Fizica pentru Facultatea de Constructii de Masini in limba **engleza** si **germana** (si postarea lor pe internet: http://utclujnmr.weebly.com/teaching.html)
- Elaborarea cursului de master (80 pag. format Power Point) „Metode nedistructive cu aplicatii in patologia constructiilor" sustinut studentilor la masterul de Patologia Constructiilor al Facultatii de Constructii (2012).
- Indrumarea in perioada **2012-2015** a **6 doctoranzi cu frecventa** (S. Muncaci, M.Simina, A. Pop, S. Boboia, A. Bede, R. Erhan) cu finalizarea in acest interval a **4 teze de doctorat**

II. Activitate institutionala

- Membru in Consiliul profesoral al Facultatii de Ingineria Materialelor si a Mediului (2012-2016);
- Membru in Senatul Universitatii Tehnice din Cluj-Napoca (2012-2016);
- Presedinte al Comisiei de Cercetare Stiintifica a Senatului UTCN (2012-2016)

- Intermedierea unui **parteneriat institutional** intre UTCN si TU Ilmenau, Germania. Acesta permite efectuarea practicii studentilor UTCN la firme din Germania cu oferirea de burse de catre acestea (1 student IMM efectuat practica in 2013).
- Organizarea in anul **2013** a **seminarului international**: **Transylvanian NMR Workshop: New frontiers of magnetic resonance.** La acest seminar au participat specialisti in RMN din Romania, Germania, Slovenia, Argentina, Rusia, China. Finantarea seminarului s-a facut cu sprijinul fundatiei Alexander von Humboldt din Germania

III. <u>Dezvoltarea Laboratorului de Difuzometrie si Relaxometrie RMN</u>

Cu ajutorul finantarii obtinute exclusiv din contractele de cercetare coordonate, in anul 2006 a fost infiintat **Laboratorul de Difuzometrie si Relaxometrie RMN**. Din dotarea laboratorului fac parte:

- Spectrometru RMN Bruker **MINISPEC MQ20** cu unitate de gradient (4T/m) si control al temperaturii (valoare aprox. 70000Euro)
- **Relaxometru RMN FFC** Stelar SmarTracer (valoare aprox. **100000**Euro-achizitionat in **anul 2012**)
- Magnet permanent + cap de proba pentru experimente inside out NMR (aprox. 10000Euro -donatie)
- Microscop metalografic **Leica DM2500M** (17000Euro-achizitionat in **2012**)
- Etuva de vid cu pompa de vid, balanta electronica (Sartorius), osciloscop, diverse multimetre
- 4 PC computere si 2 Laptopuri

IV. <u>Recunoastere internationala</u>

- Membru in comitetul de acordare a burselor **DAAD** pentru Romania
- Membru in **comitetul stiintific** al conferintei internationale Bologna Conference on Magnetic Resonance in porous Media
- Referent pentru **revistele ISI**: J. Magn. Reson. J. Chem. Phys, Magn. Reson in Medicine, Materials Chemistry and Physics, Applied Magnetic Resonance.
- **Invited speaker** la 2 conferinte internationale (vezi lista de mai jos)
- Seminari invitate la Universitatea Tehnica Ilmenau, Germania (2012, 2013, 2014) si Universitatea Debrecen, Ungaria (2014) (se pot oferi dovezi ale scrisorilor de invitatie).
- Aprox. 366 citari in reviste ISI, index Hirsch **h=12**

V. Proiecte de cercetare coordonate in ultimii 5 ani

(pentru lista completa vezi CV-ul)

Proiectul	Tema	Perioada (suma totala)	Rolul
INSTITUTSPARTNERSCHAFT with Technical University Ilmenau, Germany (Financed by **Alexander von Humboldt** foundation)	Molecular dynamics during the phase transition of liquids confined inside porous media	1.01.2011-31.12.2013 (55000Euro)	Director proiect
Project **IDEI** **PN II IDPCE 2011-3-0238**	Nuclear magnetic resonance studies of surface effects on dynamics of molecules confined inside porous media with magnetic impurities	5.10.2011 -4.10.2016 (1500000Ron)	Director proiect

VI. Lucrari stiintifice publicate in ultimii 5 ani

A) Carti/Capitole in carti

- I. Ardelean, Rezonanta magnetica nucleara pentru ingineri, Editura U.T. Press, Cluj-Napoca, 2013, ISBN: 978-973-662-905-1
- I. Ardelean and R. Kimmich, Beyond the classical NMR diffusometry, capitol in cartea: „Diffusion NMR of Confined Systems: Fluid Transport in Porous Solids and Heterogeneous Materials" (Editor Rustem Valiullin), Publisher: Royal Society of Chemistry, 2016 (in curs de aparitie, scrisa la invitatia editorului)

B) Articole in reviste indexate ISI

(toate in calitate de autor corespondent)

1. Badea, C.; Mos, R. B.; Ciontea, L.; Ardelean, I., Low-Field Nuclear Magnetic Resonance Relaxometry as a Tool in Monitoring the Aging of Coating Solutions (Case Study: Barium Propionate Precursor Coating Solution). *Applied Magnetic Resonance* **2010,** *39* (4), 365-372
2. Nechifor, R.; Ardelean, I.; Mattea, C.; Stapf, S.; Bogdan, M., NMR relaxation dispersion of Miglyol molecules confined inside polymeric microcapsules. *Magnetic Resonance in Chemistry* **2011,** *49* (11), 730-733
3. Nechifor, R.; Bogdan, M.; Ardelean, I., The Size Distribution of Core Shell Polymeric Capsules as Revealed by Low-Field NMR Diffusometry. *Applied Magnetic Resonance* **2011,** *40* (2), 205-211
4. Simina, M.; Nechifor, R.; Ardelean, I., Saturation-dependent nuclear magnetic resonance relaxation of fluids confined inside porous media withmicrometer-sized pores. *Magnetic Resonance in Chemistry* **2011,** *49* (6), 314-319

5. Simina, M.; Molnar, L.; Manea, D.; Ardelean, I., Monitoring the Air Influence on Cement-Lime Mortar Hydration Using Low-Field Nuclear Magnetic Resonance Relaxometry. *Applied Magnetic Resonance* **2012,** *43* (3), 443-450
6. Muncaci, S.; Ardelean, I., Probing the Pore Size of Porous Ceramics with Controlled Amount of Magnetic Impurities via Diffusion Effects on the CPMG Technique. *Applied Magnetic Resonance* **2013,** *44* (7), 837-848
7. Muncaci, S.; Ardelean, I., The Influence of the Magnetic Impurity Content on the Pore Size Distribution Determination via the DDIF Technique. *Applied Magnetic Resonance* **2013,** *44* (3), 365-373
8. Muncaci, S.; Mattea, C.; Stapf, S.; Ardelean, I., Frequency-dependent NMR relaxation of liquids confined inside porous media containing an increased amount of magnetic impurities. *Magnetic Resonance in Chemistry* **2013,** *51* (2), 123-128
9. Pop, A.; Badea, C.; Ardelean, I., The Effects of Different Superplasticizers and Water-to-Cement Ratios on the Hydration of Gray Cement Using T-2-NMR. *Applied Magnetic Resonance* **2013,** *44* (10), 1223-1234
10. Badea, C.; Pop, A.; Mattea, C.; Stapf, S.; Ardelean, I., The Effect of Curing Temperature on Early Hydration of Gray Cement Via Fast Field Cycling-NMR Relaxometry. *Applied Magnetic Resonance* **2014,** *45* (12), 1299-1309
11. S. Boboia, M. Moldovan, C. Prejmerean, C. Sarosi, A. Roman, I. Ardelean, Influence of Initiation System and Filler Ratio on the Properties of New Flowable Dental Composites, Materiale Plastice **52**, 104-108 (2015).
12. A. Pop and I. Ardelean, Monitoring the size evolution of capillary pores in cement paste during the early hydration via diffusion in internal gradients, Cem. Conc. Res. **77**, 76-81 (2015)

C) In reviste cu referenti

1. R. E. Nechifor, and I Ardelean, Low-Field Nuclear Magnetic Resonance Relaxometry - A Tool in Monitoring the Melting Transition of Polymeric Capsules with Applications in Drug Delivery. *International Conference on Advancements of Medicine and Health Care Through Technology* **2011,** *36*, 344-347
2. S. Boboia, M. Moldovan, I. Ardelean, Determination of Residual Monomers Resulting From the Chemical Polymerization Process of Dental Materials. *Processes in Isotopes and Molecules (Pim 2013),* AIP Conf. Proc. *1565*, 90-93 (2013)
3. S. Muncaci, S. Boboia, I. Ardelean, The Effect of Diffusion in Internal Gradients on Nuclear Magnetic Resonance Transverse Relaxation Measurements. *Processes in Isotopes and Molecules (Pim 2013),* AIP Conf. Proc. *1565*, 133-136 (2013)
4. A.Pop, C. Badea, I. Ardelean, Monitoring the Ettringite Formation in Cement Paste Using Low Field T-2-NMR. *Processes in Isotopes and Molecules (Pim 2013),* AIP Conf. Proc. *1565*, 141-144 (2013)

D) Prezentari la conferinte internationale (selectie)

1. Ioan Ardelean Marius Simina, Sergiu Muncaci,Relaxation of polar and nonpolar molecules confined inside partially saturated porous media with ferromagnetic impuritie, 10th Bologna Conference on Magnetic Resonance in Porous Media, 12-16 Sept. 2010, Leipzig, Germania

2. R. Nechifor, M. Carlos, M. Bogdan, S. Stapf, I. Ardelean, Frequency dependent NMR relaxation of polymeric nanocapsules 10th Bologna Conference on Magnetic Resonance in Porous Media, 12-16 Sept. 2010, Leipzig, Germania
3. I. Ardelean, R. Nechifor, C. Mattea, S. Stapf, Frequency dependent NMR relaxation of oil molecules confined inside polymeric micro- capsules for drug delivery, EUROMAR 2011, August 21-25, Germany (poster).
4. I. Ardelean, R. Nechifor, C. Mattea, S. Stapf, NMR as a tool in determining the size distribution of polymeric micro- capsules for drug delivery, 1st Humboldt Award Winners Forum, October 2011, 12-16, Bonn, Germany (poster).
5. M. Simina , A. Pop, C. Badea and I. Ardelean, *Monitoring the pore size distribution of ultra strong concrete samples during the early stages of hydration via internal gradients, "* 11th Bologna Conference on Magnetic Resonance in Porous Media", 9 – 13 September 2012, Guildford, UK (poster);
6. S. Muncaci, C. Mattea, S. Stapf and I. Ardelean, *NMR relaxation dispersion of polar and non-polar molecules confined inside porous media with controlled amount of magnetic impurities, "* 11th Bologna Conference on Magnetic Resonance in Porous Media", 9 – 13 September 2012, Guildford, UK (poster);
7. I. Ardelean, S. Muncaci, *Probing the pore size of porous media with magnetic impurities via NMR techniques*, International Symposium on recent advances in NMR applications to materials, 20-23 Sept. 2012, Hirschegg, Austria (oral presentation);
8. C. Badea, A. Pop, C. Mattea, S. Stapf, I. Ardelean, *FFC NMR relaxometry investigations of temperature effects on cement hydration*, International Symposium on recent advances in NMR applications to materials, 20-23 Sept. 2012, Hirschegg, Austria (oral presentation);
9. M. Simina and I. Ardelean, *High strength concrete early hydration via NMR*, International Symposium on recent advances in NMR applications to materials, 20-23 Sept. 2012, Hirschegg, Austria (oral presentation);
10. I. Ardelean, S. Muncaci, C. Mattea, S. Stapf, *NMR relaxation of fluids confined inside porous media with magnetic impurities*, 8th Conference on FFC NMR Relaxometry, 23-25 May 2013, Turin, Italy (invited speaker)
11. I. Ardelean, S. Muncaci, C. Badea, A. Pop, C. Mattea, S. Stapf, Translational di fusion at the surface of porous media with magnetic impurities via Fast Field Cycling NMR relaxometry, 5th Diffusion Fundamentals Conference, 26-28 August 2013, Leipzig, Germany (poster)
12. C. Badea, A. Pop, C. Mattea, S. Stapf, I. Ardelean, The temperature effects on cement hydration via Fast Field Cycling NMR relaxometry, 12th International Bologna Conference on Magnetic Resonance in Porous Media, 9-13 February 2014, Wellington, New Zealand (poster).
13. I. Ardelean, Monitoring the temperature effects on early stage cement hydration via Fast Field Cycling NMR relaxometry, Ampere NMR School, 22-28 June 2014, Zakopane, Poland (invited speaker)
14. I. Ardelean, The influence of temperature and the superplasticizers on cement hydration via low field NMR relaxometry, Alpine NMR Workshop "Frontiers of Magnetic Resonance: Applications to Nano- and Microscopically Structured Systems" 18-21 September 20014, Bled, Slovenia (oral presentation).

25.10.2015