



Centrul de Cercetari Tehnice Fundamentale si Avansate (CCTFA) din cadrul Academiei Romane – Filiala Timisoara (AR - FT)

Prezentarea Institutiei si a directiilor de cercetare

3 sectii, total 17 posturi cu studii superioare bugetate (22 persoane):

1. Sectia de Hidrodinamica, Cavitate si Lichide Magnetice (SHCLM);
2. Sectia de Constructii Metalice si Sudura (SCMS);
3. Sectia de Electromecanica, Vibratii si Vibropercutii (SEVV).

Director CCTFA, C. S. 1 dr. fiz. Ladislau VÉKÁS



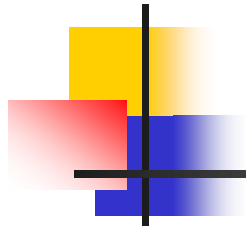
Sectia de Hidrodinamica, Cavitatie si Lichide Magnetice (SHCLM)

2 lab. totalizand 11 posturi cu studii superioare (12 persoane):

1. Laboratorul de Lichide Magnetice (LLM), 6,5 posturi cu studii superioare sustinute de la buget, ocupate de 7 persoane: 3 x C.S. 1, 1,5 x C.S. 2, 1 x C. S. 3 si 1 x As. c., la care se adauga 2 posturi sustinute din contracte;

2. Laboratorul de Hidrodinamica si Cavitatie (LHC).

Sef sectie SHCLM, Acad. Ioan ANTON

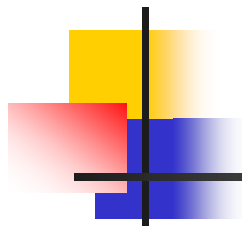


Laboratorul de Lichide Magnetice (LLM).

Directii de cercetare

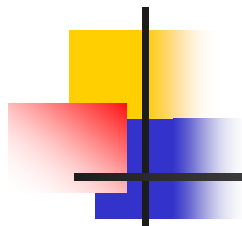
1. Prepararea de lichide magnetice (LM = nanofluid magnetic), lichide/suspensii magnetoreologice (LMR = microfluid magnetic), nano-compozite magnetizabile si alte nano/micro fluide controlabile magnetic (magnetizabile);
2. Caracterizarea nano/micro fluidelor magnetizabile din punct de vedere dimensional, magnetic, reologic, optic, etc.;
3. Aplicatii ale nano/micro fluidelor magnetizabile in domeniile tehnic si bio-medical.

Sef laborator LLM, C. S. 1 dr. fiz. Ladislau VÉKÁS



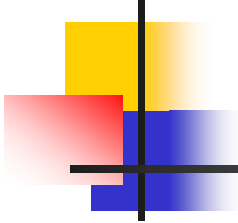
LLM - Contracte CEEEX si PNII

1. Nanoparticule pe bază de fier și oxid de fier pentru nanofluidе magnetice: preparare, caracterizare și aplicații. Program CEEEX–(FeMANANOF), Subctr. nr. 551/05.10.2005 –2008 .
2. Nanofluidе magnetice pentru etanșări rotitoare fără scăpări: producere, caracterizare multiplă și experimentare in modele de etanșare de inaltă performanță. Program CEEEX– (NanoMagneFluidSeal), Ctr.83/2006.
3. Materiale nanocompozite magnetice pentru diagnosticul tumorilor maligne cu metoda de rezonanta magnetica. Program CEEEX (MAGMED), Subcrt.nr. 445/13.07.2006.
4. Nanoparticule magnetice cu structura „core-shell” acoperite cu metale nobile si polimeri conductori: sinteza, caracterizare si aplicatii. Program CEEEX-(NANOMAGMETNOB) Subcrt.nr. 485/24.07.2006.
5. Compatibilitatea functionala a echipamentelor electrotehnice speciale, cu ferrofluidе magnetice(treceri izolate, transformatoare de masura, ondulatorе pentru microparticule fizice, divizoare de tensiune la frecventa industrială). Program PN-II (CFEEL), Crt. nr.21-059/2007.
6. Sistem de etansare pe baza de nanofluidе magnetice pentru robineti de gaz. Program PN-II (SEMAROGAZ).



LLM - Contracte CEEEX si PNII

7. Procesarea de nanostructuri magnetice avansate sub forma de nanoparticule. Program PN-II (BIMAPAFLU), Crt.nr.71-083/2007.
8. Sisteme nanostructurale biocompatibile pe baza de nanoparticule magnetice si polimeri cu raspuns la stimulii externi. Program PN-II (NANOMAGPOLI), Crt.nr.71-068/2007
9. NANOSIM – Procese de transport si structurale la scara micro- / nanometrica in biomedicina si stiinta materialelor. Program CEEEX Ctr. 11 / 2005 – 2008.
10. „Producere de nanoparticule magnetice avansate in procese si produse inteligente pentru viata” (Advanced Magnetic nanoparticles deliver smart Processes and Products for Life). Acronim MagPro²Life, 2009-2013. ComisiaEuropeana-FP7. 287 000 Euro (Partea LLM-CCTFA), Val totala contract: 7.400.000 Euro.
11. Nanofluid magnetic – un nou mediu izolator și de răcire pentru transformatoarele electrice (Magnetic Fluid – New Insulated and Cooling Medium for Power Transformers). Nr. 7-018, Acronim MAFINCO/2009, Cooperare regionala: Slovacia, 2009-2012, 432.000 RON partea romana.



LLM – Lucrari stiintifice ISI, in reviste cu factor de impact, in ultimii 5 ani

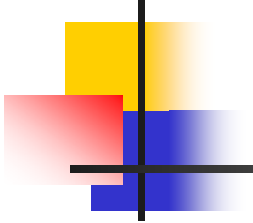
40 de lucrari publicate in reviste cu factor de impact,
in perioada 2006 – 2010 si cateva sute de citari in reviste ISI.

■ Preparare

1. I. Morjan, R. Alexandrescu, F. Dumitrache, R. Birjega, C. Fleaca, I. Soare, C. R. Luculescu, G. Filoti, V Kuncer, **L. Vekas, N. C. Popa**, G. Prodan, V. Ciupina, *Iron Oxide-Based Nanoparticles with Different Mean Sizes Obtained by the Laser Pyrolysis: Structural and Magnetic Properties*, **Journal of Nanoscience and Nanotechnology**, Vol. 10, Issue 2 (2010) pp. 1223 – 1234.
2. A. Nan, S. Karsten, I. Craciunescu, Rodica Turcu, **L. Vékás**, J. Liebscher, *New shells for magnetic nanoparticles based on polypyrrole functionalized with α -amino acids*, **ARKIVOC (xv)**, pp. 307 - 320 (2008).
3. Maria Bălăsoiu, M. V. Avdeev, V. L. Aksenov, D. Hașegan, V. M. Garamus, A. Schreyer, **Doina Bica, L. Vékás**, *Structural organization of water - based ferrofluids with sterical stabilization as revealed by SANS*, **J. Magn. Magn. Mater.**, Vol.300, 225-228 (2006).

■ Caracterizare

1. **Daniela Susan-Resiga, Doina Bica, L.Vekas**, *Flow behaviour of extremely bidisperse magnetizable fluids*, **J. Magn. Magn. Mater.** 322 (2010) pp. 3166-3172.
2. **N. C. Popa**, A. Sibli, J. J. Rousseau, M.-F. Blanc-Mignon and J. P. Chatelon, *Approximation of magnetic behavior of the complex nanomagnetic materials, using the “P” curves for structural characterization of magnetic suspensions*, **phys. stat. sol. (a)** 205, Nr. 8 (2008) pp. 1817 - 1820.



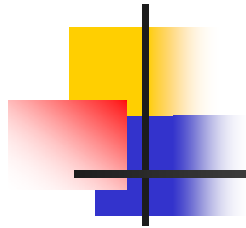
LLM – Lucrari stiintifice ISI, in reviste cu factor de impact, in ultimii 5 ani

■ Aplicatii tehnice

1. F. D.Stoian, S. Holotescu, V, Stoica, **Doina Bica, L. Vékás**, *Comparative study of convective heat transfer in water and water based magnetizable nanofluid for thermal applications*, **J. Optoelectronics and Advanced Materials**, Vol.10, No.4, pp. 773-776 (2008).
2. **N. C. Popa**, A. Siblino, J. J. Rousseau, Marie-Françoise Blanc-Mignon, Beatrice Payet-Gervy, B. Bayard, and, C. Nader, *Numerical model for ultra thin electrical coils with magnetic fluid core*, **International Journal of Applied Electromagnetics and Mechanics (IJAEM)**, Vol. 28, Nr. 3 (2008) pp. 371 - 378.
3. **N. C. Popa**, A. Siblino, J. J. Rousseau, Marie-Francoise Blanc-Mignon, *Magnetic fluid sensors network – The case of the sensors having linear reply time*, **Sensor Letters** Vol. 5 (2007) 138-141.

■ Aplicatii Bio

1. M. V. Avdeev, Birte Mucha, Katrin Lamszus, **L. Vekas**, V. M. Garamus, A. V. Feoktystov, Oana Marinica, Rodica Turcu, Regine Willumeit, *Structure and in Vitro Biological Testing of Water-Based Ferrofluids Stabilized by Monocarboxylic Acids*, **Langmuir**, 26 (11) (2010) pp. 8503-8509
2. P. Papaphilippou, L. Loizou, **N. C. Popa**, A. Han, **L. Vekas**, A. Odysseos, and, T. Krasia-Christoforou, *Superparamagnetic Hybrid Micelles, Based on Iron Oxide Nanoparticles and Well-Defined Diblock Copolymers Possessing beta-Ketoester Functionalities*, **Biomacromolecules**, Vol. 10, Issue 9 (2009), pp. 2662 - 2671.
3. E. Tombácz, **Doina Bica**, A. Hajdu, E. Illés, A. Majzik, **L. Vékás**, *Surfactant double layer stabilized magnetic nanofluids for biomedical application*, **J. Phys. Condensed Matter**, Vol.20, 204103 (6 p.) (2008)

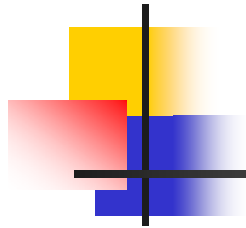


LLM – Contract de transfer tehnologic CEEX – NanoMagneFluidSeal

Nanofluide magnetice pentru etanșări rotitoare fără scăpări:
producere, caracterizare multiplă și experimentare in modele de
etanșare de inaltă performantă.

Consortiu:

- P1 (Coordonator): LLM al CCTFA, AR-FT
P2: S. C. ROSEAL S. A. Odorheiul Secuiesc
P3: CNISFC – UPT, Timisoara
P4: INCDF, Bucuresti - Magurele



LLM – Contract de transfer tehnologic CEEX – NanoMagneFluidSeal

Obiective

- Realizarea unei unitati de micro-productie de nanofluid magnetice pentru etansari;
- Producerea de nanofluid magnetice pentru etansari:
 - la **scara micro-pilot**, magnetizatia de saturatie **400-1100 Gs** (~30-90 kA/m)
 - la **scara de laborator**: magnetizatia de saturatie ridicata **1100 – 1900 Gs** (~100-150 kA/m)
- Caracterizarea si analiza comparativa
 - **structurala** (TEM, DLS, SANS) - stabilitatea coloidala in camp magnetic intens (~ 1 T)
 - **magnetica** (Mössbauer, VSM);
 - **reologica si magneto-reologica** a nanofluidelor magnetice pentru etansari
- Experimentarea nanofluidelor magnetice realizate in modele de etansari rotitoare
- Validare procedee de obtinere si set de nanofluid magnetice pentru etansari rotitoare fara scapari

Modul de finalizare: transfer tehnologie, instalatie microproductie, lichide magnetice pentru etansari

Diseminarea rezultatelor: brevete, articole, comunicari la conferinte, seminarii internationale si nationale, catalog de produse

LLM – Contract de transfer tehnologic

CEEX – NanoMagneFluidSeal



Amenajare hala



Masa de lucru operator



Pregatire reactanti



Hala pilot



**Instalatie micropilot –
vedere de ansamblu**

Experimental stand for NFM seals (S.C. ROSEAL S.A. Odorheiul Secuiesc)

Electrical energy supplying and command module

Pressure module

Test module



Vacuum module

Acquisition, transmission, recording and processing data module
(S.C. ROSEAL S.A. Odorheiul Secuiesc)

Seal diameter:

- max.: 240 mm

Rotational speed:

- max.: 3000 rot / min

Test pressure:

- min : 10^{-7} bar

- max.: 50 bar



LLM – Contract de aplicare industrială PNII – SEMAROGAZ

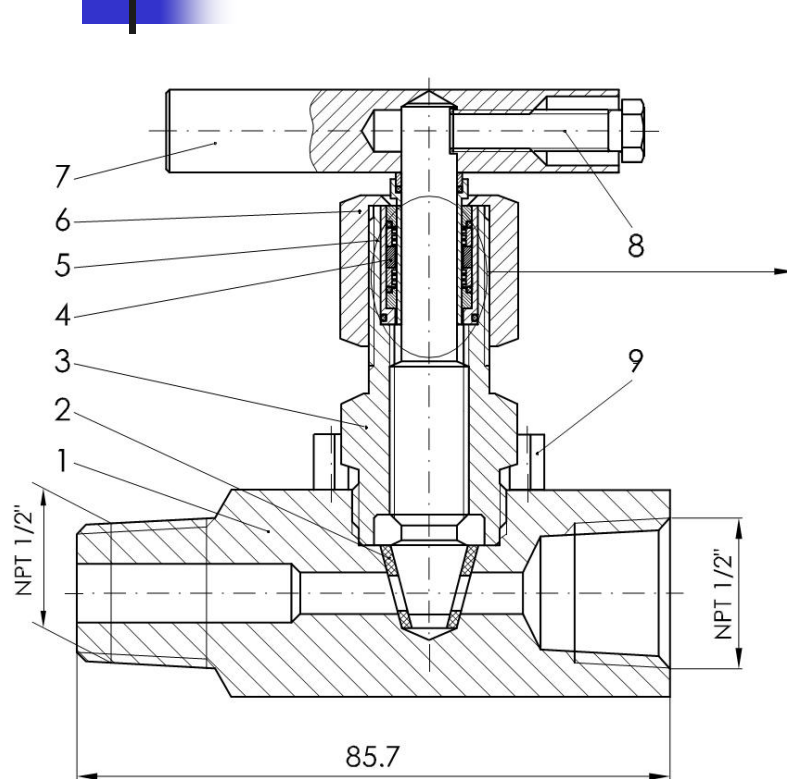
Sistem de etansare pe baza de nanofluid magnetice
pentru robineti de gaz.

Consortiu:

P1 (Coordonator):	S. C. ROSEAL S. A. Odorheiul Secuiesc
P2:	LLM al CCTFA, AR-FT
P3:	ICPE-CA Bucuresti
P4:	S.C. FEPA S.A. Barlad

Project Semarogaz

Gas valves up to 40 bar equipped by a sealing system using high magnetization magnetic nanofluids or magnetic composite fluids
(producer S. C. ROSEAL S. A. Odorheiul Secuiesc)



Components:

- Body
- Valve seat
- Guide
- **Magnetic liquid seal**
- Bar (Valve stem)
- Stuffing box
- Valve Handle
- Screw
- Spiral elastic suspension pin

- Independent open-close cycle lifetime
- leakage-free operating regim



(S.C. ROSEAL S.A. Odorheiul Secuiesc)

(S.C. ROSEAL S.A.
Odorheiul Secuiesc)

LLM – Contract European (FP7) in domeniul biotehnologiilor avansate – MagPro²Life



**Advanced Magnetic nano-particles deliver
smart Processes and Products for Life**



Parteneri:

Solae LLC

Karlsruhe Institute of Technology Bioprocess Engineering
Karlsruhe Institute of Technology Process Machines
Merck KG

Swiss Federal Institute of Technology
Forschungszentrum Karlsruhe

University of Salamanca - APLICAMA Research Group
Danmarks Tekniske Universitet
University of Birmingham
FluIT Biosystems GmbH

Academia Romana – Filiala timisoara

TU Bergakademie Freiberg
University College Dublin
Krauss Maffei Process Technology
Bühler AG

National Institute for Isotopic and Molecular Technologies
National Institute for Laser, Plasma and Radiation Physics

- Sinteza, caracterizarea si
functionalizarea particulelor
magnetice
- Elaborarea si testarea procedeeor
de separare magnetica
- Testarea aplicatiilor tehnologice

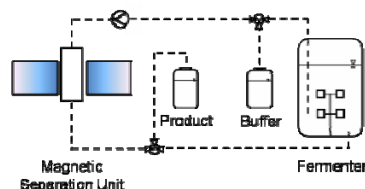


Advanced Magnetic nano-particles deliver smart Processes and Products for Life



Testarea aplicatiilor tehnologice

In-situ product removal of enzymes applied in Feed during fermentation



- Fermentation intensification via the integration of multi in situ magnetic separation steps
- Prevention of product degradation by capturing e.g. proteases



Applications to be tested

Recovery of nutraceutical biomolecules from large scale natural Food streams

- Exploitation of high value functional food proteins from soy process streams with specific attributes for health, well-being and/or prevention of diseases



Demonstration of the validity of magnetic separation technology for high throughput food industries

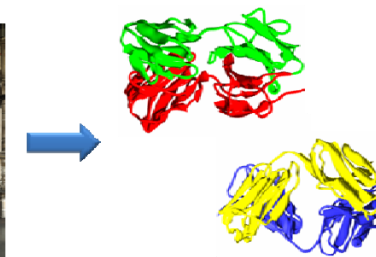


Direct capture of high value Biopharma proteins from crude feed streams

- One step purification of novel antibody fragments (FABS) with potential application in therapeutics, medical diagnostics and analytics.



E.Coli Fermentation



FABS

- Systematic benchmarking of magnetic nanoparticle-based bioseparation processes against established techniques like e.g. chromatography

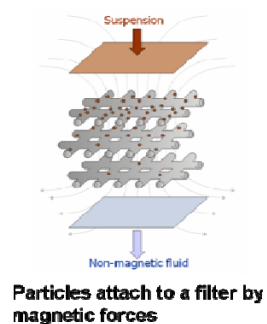


Advanced Magnetic nano-particles deliver smart Processes and Products for Life

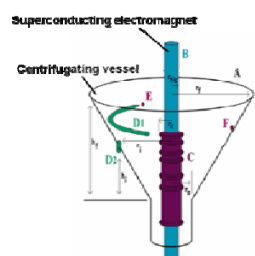


Elaborarea si testarea procedeeilor de separare magnetica

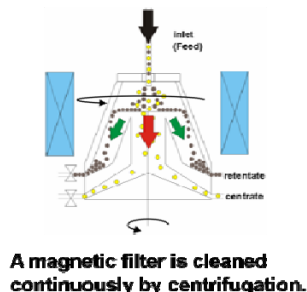
High Gradient Magnetic Filtration



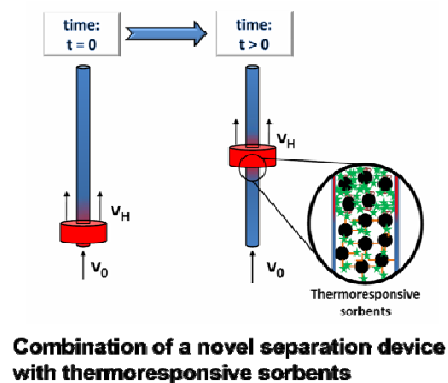
Magnetic Classification



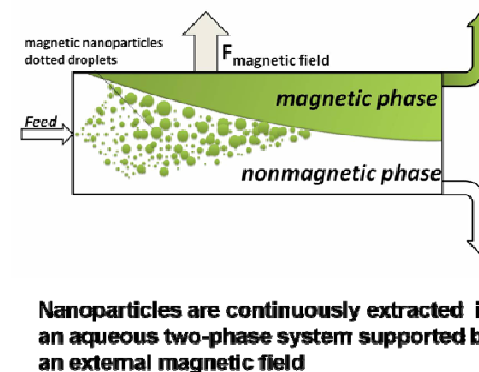
Magnetic Field Enhanced Centrifugation



Travelling Heating Zones Reactor



Continuous Magnetic Extraction

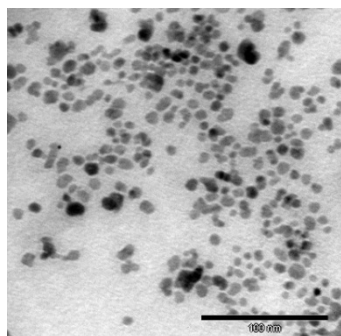




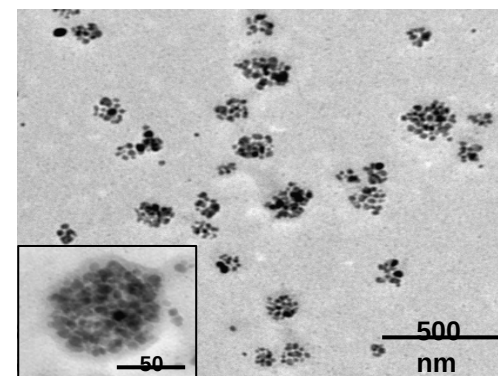
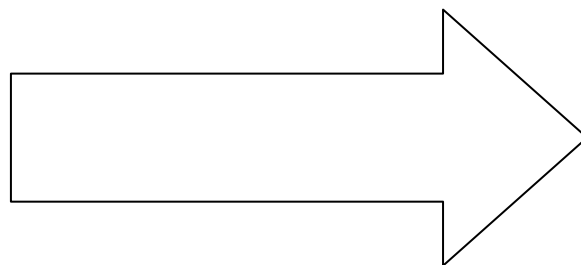
Advanced Magnetic nano-particles deliver smart Processes and Products for Life



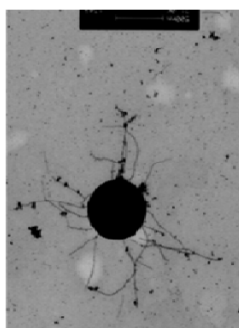
Sinteza, caracterizarea si functionalizarea particulelor magnetice



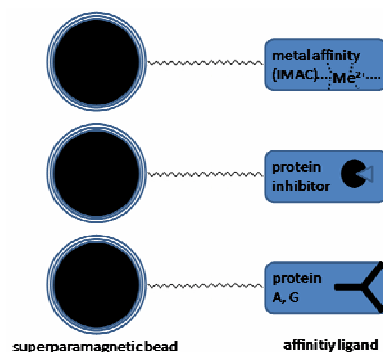
Nanoparticle magnetice (~7 nm)
AR-FT / LLM



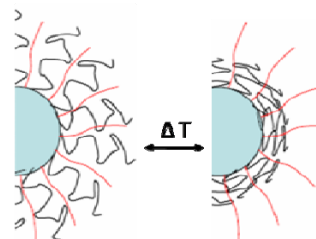
Nanocompozite magnetice (~100 nm)



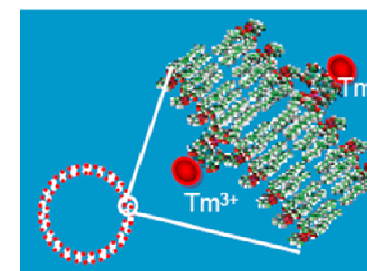
Attachment of phages



Affinity ligands



Thermoresponsive materials



Functionalized vesicles