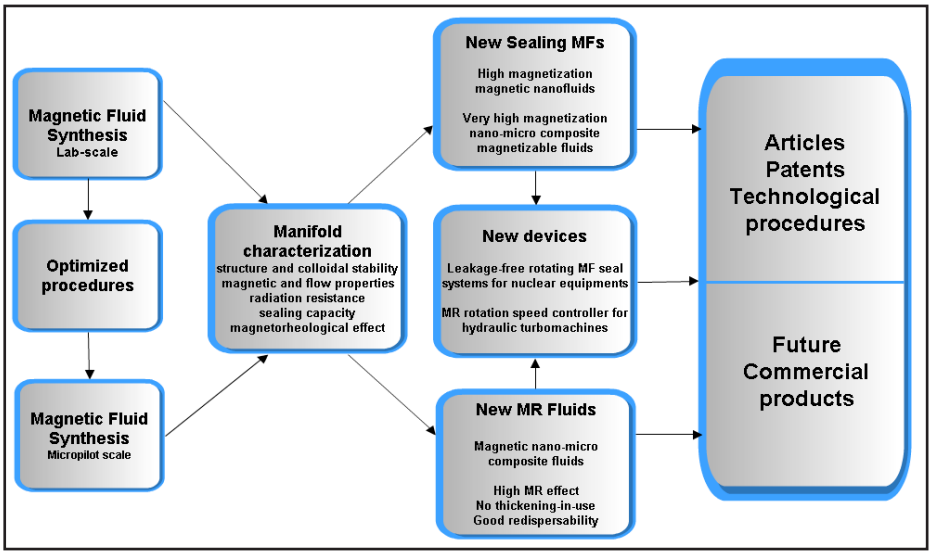
HIGH MAGNETIZATION MAGNETIC NANOFLUIDS AND NAO-MICRO-COMPOSITE MAGNETIZABLE FLUIDS: APPLICATIONS IN HEAVY DUTY ROTATING SEALS AND MAGNETORHEOLOGICAL DEVICES

Goal of the project

The project is oriented to the extension of the performances of rotating seals and adaptive motion control devices to meet the requirements of several well-defined new applications, by high and very high magnetization sealing fluids and new types of magnetorheological fluids to be synthesized.

Short description of the project

The project concept and objectives are illustrated schematically in figure the below:



Project implemented by

- Romanian Academy – Timisoara Branch (Project coordinator),
- Politehnica University of Timisoara (Partner 1),
- S.C. ROSEAL S.A. Odorheiu Secuiesc (Partner 2)
- National Institute for R&D in Electrical Engineering ICPE-CA Bucharest (Partner 3).

Implementation period

23.07.2012 - 23.07. 2016.

Main activities

The main activities of the MagNanoMicroSeal project are:

- Synthesis and manifold characterization of magnetizable fluids for high pressure and heavy duty rotating seals and magnetorheological devices and, respectively,
- Design, fabrication and testing of leakage – free magnetofluidic rotating seal and magnetorheological (MR) control devices for well-defined applications/exploitation conditions.

Results

The main results of this project refer to the elaboration of the following **technological procedures:**

- synthesis of high magnetization sealing fluids;
- synthesis of nano-micro structured magnetorheological fluids;

and **qualification procedures:**

- magnetic nanofluids for sealing applications in nuclear equipments;
- magnetic nanofluids for rotating seals for nuclear equipments.

The project results will be disseminated through publications in leading scientific journals, through presentations at national and international scientific meetings. Also, the involved procedures, technologies, devices and know-how are favourable for patent applications, as well as for development and exploitation by the industrial partner from the project. .

The contributions of Politehnica University of Timisoara to this project refer mainly to complex magnetic, rheological and magneto-rheological analyses of the magnetic sealing fluids and nano-micro structured magnetorheological fluids. During the current year the Politehnica University team is in charge of the characterisation of the magnetic nanofluids to be used for seals submitted to heating and radiation.

Applicability and transferability of the results

The technological progress is strongly evidenced by future commercial products planned for the industrial partner S.C. ROSEAL S.A.: 16 new types of magnetically controllable fluids, 1 prototype and 3 functional models of magnetofluidic devices for nuclear and hydraulic power engineering.

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Research centre

- Research Center for Engineering of Systems with Complex Fluids, Politehnica University of Timisoara
- Magnetometry Laboratory, Rheology Laboratory, Numerical Simulation and Parallel Computing Laboratory
  URL: http://mh.mec.upt.ro/ccisfc/

Research team

The project research team consists of 42 researchers, engineers and technicians
Dr. Ladislau Vekas - the project manager
Assoc.Prof. Floriana D. Stoian, PhD
Phys. Oana Marinica
Lect. Sorin Holotescu, PhD
Assoc. Prof. Nicolae Crainic, PhD
Lect. Andreea Dobra, PhD
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