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POSTDOC PROPOSAL

Acoustic Response of Fluid Transport in Nanoporous Materials



INSTITUT D'ELECTRONIQUE ET
DES SYSTEMES

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Ecological transition and migratory crises lead to growing needs in compound separation (depollution, water treatment, CO₂, CH₄, H₂ separation). Membrane processes based on nano-porous materials are relevant because they are economically viable and technologically mature. Their extension requires transposing their operation to extreme and/or constrained environments. In this quest, monitoring methods must be developed and acoustic methods offer enormous unexplored potential.

In this context, the National Research Agency (ANR) supports our work and in particular one of our collaborative projects aimed at leading to a paradigm shift with breakthroughs in membrane science and beyond. The collaboration of experimenters and theoreticians should promote rapid progress towards a proof of concept relating to the methods of control and monitoring of membrane processes. In particular, the development of methods for online monitoring of materials and the treatment of fluids in their porosity is an objective of the project, a valuable step towards new instrumentation, and would constitute a breakthrough towards applications in separation or catalysis. This project is of a fundamental nature but could lead to a direct industrial transfer (VEOLIA, Saint Gobain, MISTRAS, Total, etc.).

The post-doctoral fellow recruited for 12 months renewable within this ANR project will aim to lead, in consultation with two main actors of the project, the Institute of Electronics and Systems - UMR5214 - and the European Institute of Montpellier – UMR5635 –, experiments and associated treatments relating to the intraoperative control by Acoustic Emission of filtration membranes.

Laboratory

The IES Institute of Electronics is a CNRS-UM UMR with more than 240 employees (permanent, doctoral students, interns). This laboratory, specialist in reliable electronic components and systems for Observation and Measurement in extreme and hostile environments (Space, Nuclear, Defense and Sea), benefits from recognition at the state of the world art on four strong themes : Infrared, Reliability, Sensors and TeraHertz.

The IES on each of its 4 strong themes carries a very high level structuring action:

Infrared: Equipex EXTRA (€4.2m) – manufacturing of lasers and photodetectors

Reliability: CSU (Centre Spatial Universitaire) – Assembly of Nanosatellites

Sensors: Smart Objects Platform (more than 350 federated SMEs)

Terahertz: HERMES platform (HF expertise center open to industry)

Specialist in components and systems in the fields of electronics, micro-electronics, photonics, energy, thermal and acoustics, the IES is able to provide

scientific and technologies for the observation, measurement and analysis of physical phenomena in extreme and/or hostile environments and thus participate in the resolution of the societal challenges of this beginning of the 21st century (energy, water, food, health, town planning, security, climate change, pollution, changes in sports practices, etc.).

The IES collaborates with many national and international universities and research centers, as well as with national establishments (ADEME, CEA, CNES, ONERA). It maintains many partnership relations with the industrial world and in particular with large companies such as IBM, EDF, SAGEM, AREVA, THALES, STMICROELECTRONICS, NEXANS, CONTINENTAL, PHOTONIS, EADS.

The effectiveness of these academic and industrial partnerships is reflected in numerous patent filings, the obtaining of numerous doctoral scholarships and numerous contributions to the creation and development of several SMEs. The IES is one of the rare laboratories to have within it a scientific incubator through its "Start-up Space" entirely dedicated to the reception/creation of this type of structure

Required profile

Doctor in Acoustics, Instrumentation

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