H2020 MSCA - ITN - 2017 - 766007

# MaMi

## Magnetics and Microhydrodynamics, from guided transport to delivery

*ESR 8 Behaviour of Liquids Under Extreme Magnetic Field Gradient*

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| **Research project** | Decreasing the system size makes the magnetic force field density increase. Nanopatterned magnetic structures therefore make it possible to achieve or exceed the highest reported magnetic forces in literature, and can be imposed at the atomic scale of solid-liquid interfaces.[1] Our motivation is to see **how extreme magnetic forces at the nanoscale can impact fluid properties and local chemical reactions.** Fundamentals of water-based solutes will be investigated under the extreme magnetic-force stress conditions, which arise at the apex of nanoscale magnetic structures, like magnetic cilia, the apex of patterned magnetic media, or magnetic nanoparticles. We propose to investigate the structural behaviour of water solutions near planar patterned media producing high magnetic gradients, as well as to use a chemical redox probe to investigate how chemical reactions can be impacted at these interfaces. We will take advantage of our experience in electrochemistry, with in-situ measurements of the local conductivity of these systems. In the last stage, we will test the behavior under external applied magnetic fields, capable of switching the applied force field.<br><br>[1] P.L. Popa et al., *Proc. Natl. Acad. Sci. U. S. A.*, **111** (2014), 10433–37. |
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| **Host Institution** | University of Strasbourg CNRS<br><br>Institute of Physics and Chemistry of Materials of Strasbourg<br>23 Rue du Loess 67034 Strasbourg France<br>http://www.ipcms.unistra.fr/?lang=en |
| **Required profile** | The candidate should hold a MS degree in Physics or Chemistry, with a strong background in Condensed Matter, Magnetism, or Physical Chemistry. Interest for interdisciplinary research is important. Research stays are planned at the Institut Josef Stefan (Slovenia) and Universidad Del Pais Vasco (Spain), and an industry (Kolektor Group). The candidate should not have stayed in France for more than 12 months in the past 3 years. |