



Magnetics and Microhydrodynamics, from guided transport to delivery

ESR 1 Magnetically Actuated Artificial Cilia

Research project	<p>Smart materials can provide new ways of fluid control and manipulation when integrated in microfluidic devices. In particular, artificial cilia, when fabricated in the walls of microfluidic devices, can be used, as versatile tools for the movement of liquid on confined spaces.¹ Here, the surface of microfluidic channels as well as flat surfaces will be patterned with artificial cilia.</p> <p>Different fabrication techniques will be evaluated: use of PDMS with integrated magnetic nanoparticles for cilia fabrication and photopatterning of ionogels and polymers with magnetic and/or photoactive properties at flat surfaces. Investigations will be carried out to grow the cilia from the surface, and to actuate them with light or magnetic forces. The generated structures will be pillars of width ranging from 100 μm down to 2 μm.</p> <p>The fabrication of microfluidic devices will be carried out in order to better accommodate the cilia and to study relevant fluidic properties such as mixing and surface roughness.² The performance of the microfluidic devices for free transport through cilia actuation will be investigated.</p> <p>¹ M. Czugala et al., <i>Sensors Actuators B Chem.</i>, 194 (2014), 105–13. ² J. Saez, L. Basabe-Desmots and F. Benito-Lopez, <i>Microfluid. Nanofluidics</i>, 20 (2016), 1–7.</p>
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Host Institution	University of the Basque Country UPV/EHU Analytical Microsystems & Materials for Lab-on-a-Chip Group (AMMa-LOAC). Microfluidics Cluster UPV/EHU Faculty of Pharmacy (Analytical Chemistry Department) Paseo de la Universidad 27 01006, Vitoria-Gasteiz, Spain
Required profile	The candidate should hold a MS degree in Chemistry, with a strong background in synthetic chemistry and/or polymer chemistry. Knowledge in microfluidics are desirable. Interest for interdisciplinary research is important. Research secondments are planned at Elvesys in France (ELV), the Max-Planck-Gesellschaft zur Forderung der Wissenschaften (MPG) in Germany and the Centre National de la Recherche Scientifique (CNRS-IPCMS) in France. The candidate should not have lived in Spain in the past 12 months.