Call reference number	(2025-25)
Call name	Predoctoral position: Patterning of optically-active nanomaterial assemblies
Application Deadline	2025/07/15

Introduction and main description

BCMaterials, the Basque Center for Materials, Applications and Nanostructures, Leioa, Spain (www.bcmaterials.net), is an autonomous research center, belonging to Ikerbasque, the Basque Foundation for Science, and the University of the Basque Country (UPV/EHU).

We seek a pre-doctoral researcher in Chemical Physics/Materials Chemistry focusing on emerging colloidal techniques for deposition of nanomaterials to pattern optically-active surfaces. We offer a full-time position for one year. The position focuses on developing novel patterning techniques harnessing light-directed colloidal assembly at interfaces.

Thermophoresis, the movement of molecules and colloids under a thermal gradient, has been recently shown to be effective for localized trapping and manipulation of colloidal particles at interfaces. Recently, our group has overcome barriers to achieve the rapid printing of colloids via thermophoresis and interfacial interactions between nanoparticles and solid substrates. However, fundamental challenges persist, including limited understanding of the role of polarized light on the printing process and the properties of resulting assemblies. Understanding these aspects can open the door to rapid and template-free patterning of optically-active assemblies on solid surfaces, with unique properties critical for sensors and devices.

The work will involve the synthesis of ligands, functionalization of nanomaterials and solid substrates with different chemical moieties, and fabrication of assemblies via the use of a custom optical setup. Fabricated assemblies will be characterized by techniques such as dark field microscopy, electron microscopy, and various types of optical spectroscopy. Detailed studies of the colloidal interactions between nanoparticles, ligands, and solvent will provide the opportunity for combining experimental and computational studies.

Skills and Requirements

A Master's Degree in Chemistry or a related field.
A strong research background in nanoparticle synthesis/functionalization/assembly.
Experience working with laser-based optical setups is beneficial.
Proficiency in speaking and writing in English.
Self-motivation and ability to work in a team.
Willingness to coordinate research.
A high level of motivation and independent thinking skills.
Ability and eagerness to learn new skills outside their own discipline.
Presentation skills and ability to meet deadlines.

Work Program / Duties / Responsibilities

Main responsibilities include:
Synthesis, surface modification, and characterization of nanoparticles
Characterization of printed assemblies of nanoparticles, including techniques such as:
- Scanning electron microscopy (SEM)

Work Program / Duties / Responsibilities
- Back-scattered UV-visible spectroscopy - Surface enhanced Raman scattering spectroscopy (SERS) Developing a theoretical understanding of the mechanism involved in the printing process using computational methods such as: - Molecular Dynamics simulations - Multiphysics and fluid dynamics simulations Additional responsibilities: Writing of manuscripts Presenting research at national/international conferences Maintaining optical setup and lab equipment Working closely with collaborators Maintaining a positive and collaborative group atmosphere Further details: The pre-doctoral researcher will be incorporated at BCMaterials under the supervision of Eric H. Hill, Ikerbasque Research Associate Professor. The candidate will be in close contact with several renowned international groups in the fields of colloidal chemistry and nanoscience in Europe and abroad.

Application Procedure
Apply by submitting a motivation letter and a CV (in English) using the "Contact" button at the corresponding offer, at the "Join Us" area on BCMaterials' portal (https://www.bcmaterials.net/join-us). Your name and email address will be required for furher contact too.

Other Relevant Information
Include contact details for 2 referees. Interviews will be conducted soon after the deadline. The preferred starting date to join is September 1, 2025.