PhD Position in Soft Matter

Protein-Mimetic Folding and Dynamics in Single-Chain Polymer Nanoparticles

We are offering a fully funded 3–year PhD position in Soft Matter, jointly supervised by the Centro de Física de Materiales (CFM-MPC, CSIC-EHU, Spain) and the Institut Laue-Langevin (ILL, Grenoble, France).

This PhD project aims to investigate the structure and internal dynamics of heterograft single-chain polymer nanoparticles (SCNPs)—synthetic macromolecules that fold into compact, protein-like conformations driven by hydrophobic, polar, and electrostatic interactions. These systems serve as simplified physical models of protein folding and intrinsically disordered proteins, with relevance for biomimetic self-assembly.

The project will combine polymer synthesis, small-angle X-ray and neutron scattering (SAXS/SANS), and neutron spin echo spectroscopy (NSE) to establish quantitative structure–dynamics relationships in folded synthetic macromolecules. Particular emphasis will be placed on understanding the transition from flexible polymer-like dynamics to globular, protein-like behavior.

Research environment and supervision

The PhD student will be enrolled at the University of the Basque Country (EHU) and will work under joint supervision of Dr. Paula Malo de Molina (CFM-MPC, CSIC-EHU, Spain) and Dr. Ingo Hoffmann (instrument responsible on IN15 in ILL, Grenoble, France). The student will be based in ILL (Grenoble) making visits to CFM (San Sebastián).

Your tasks

- Synthesize heterograft copolymers using controlled radical polymerization
- Characterize SCNP structure using SAXS and SANS and perform neutron spin echo (NSE) experiments to probe internal chain dynamics.
- Analyze scattering and dynamical data using physical models.
- Correlate chemical composition, folding degree, and relaxation dynamics.
- Present results at international conferences and publish in peer-reviewed journals.

Your profile

- Master's degree in Chemistry, Materials Science, Soft Matter, or a related discipline.
- Strong interest in soft matter, polymers, or biophysics.
- Experience with scattering techniques or polymer characterization is desirable but not mandatory.
- Fluent written and spoken English.
- Willing to work in an international, interdisciplinary research environment.

Application

To apply, please send an email including your CV and cover letter to p.malodemolina@ehu.eus and hoffmann@ill.fr. Applications will be reviewed on a rolling basis until the position is filled.