



A joint Ph.D. position co-financed by the Institut Laue-Langevin (ILL) and Jülich Centre of Neutron Science (JCNS-1) at Forschungszentrum Jülich is available on the subject:

Magneto-rheological one single component nanocomposites.

Applications of functional polymer-based materials in nanotechnology assume chemical tuning of different components and reliable processing. In particular, conventional nanocomposites consist of nanoparticles (filler) and polymer matrix mixed together at different environmental and chemical conditions. The main complexity, especially at relatively high volume filler concentrations, is related to the homogeneous and controlled distribution of the nanoparticles in the polymer matrix. Control of dispersity and distance between the nanoparticles is a direct way to e.g. optical applications based on the phenomena like plasmon resonance or gas permeation membranes allowing to tune the nanocomposite selectivity.

In this PhD project one single component nanocomposites consisted of polymer-grafted magnetic nanoparticles without blending with a polymer matrix will be designed. The dispersity and distance between the polymer-grafted nanoparticles will be tuned by grafted polymer chain length and grafting density variation and by applying an external magnetic field. The PhD work aims at (i) synthesis of nanocomposites including magnetic nanoparticles, deuterated and hydrogenated polymers functionalized with ligand groups and following the grafting; (ii) the characterization with scattering methods (X-ray and neutrons) and microscopy (TEM) (iii) the investigation of polymer chain dynamics by QENS and macroscopic properties (rheology).

Conditions:

The successful candidate will be enrolled as Ph.D. student at the RWTH Aachen, Germany. He/She will spend the first year of the work at the JCNS at Forschungszentrum Jülich (FZJ) and two years at the Institut Laue-Langevin (ILL) in Grenoble, France.

Required skills:

- M.Sc., diploma or equivalent in physics, chemistry, materials science or a related field.
- Previous experience with neutron scattering would be an advantage.

Application

The application should include a CV, a grade transcript, recommendation and motivation letters. Questions can be addressed to Margarita Kruteva m.kruteva@fz-juelich.de and Ingo Hoffmann hoffmann@ill.fr.