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## Impact of the Environment on the PNIPAM Dynamical Transition Probed by Elastic Neutron Scattering

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Hydrated proteins undergo a dynamical transition (DT) at  $T_d \approx 200$  K. The transition is associated with the activation of protein dynamics on the ps-ns time scale, suitably detected by Elastic Incoherent Neutron Scattering (EINS). The DT has been also observed in other biomolecules and is deemed necessary for biological functionality. Surprisingly, a DT has been recently found in a non-biological system, i.e. poly(N-isopropylacrylamide) (PNIPAM). Despite its synthetic nature, PNIPAM is able to reproduce the complex solvent-macromolecule interactions at the basis of biological processes. The generality associated with the observation of the DT suggests a prominent role of the solvent. Indeed, the characteristics of the DT are strongly modified when the protein is embedded in glassy matrices of stabilizing compounds. Stabilizers inhibit the protein mobility by shifting  $T_d$  toward higher temperature values and by reducing the amplitude of associated protein motions. Interestingly, the constraining action on protein fast dynamics is thought to be related to the bioprotectant ability promoted by stabilizers over longer timescales, although the microscopic details of these processes are unclear. By means of EINS techniques, we exploited the bio-mimic behaviour of PNIPAM by investigating the fast dynamics of PNIPAM chains when in presence of water/stabilizer mixtures. As in proteins, we found a tight connection between polymer dynamics and characteristics of the solvent.

**Authors:** Dr ROSI, Benedetta Petra (Forschungszentrum Jülich); D'ANGELO, Arianna (Université Paris Saclay, ILL); BURATTI, Elena (Sapienza University); ZANATTA, Marco (University of Trento); TAVAGNACCO, Letizia (Sapienza University); NATALI, Francesca (ILL); ZAMPONI, Michaela (Forschungszentrum Jülich GmbH, Jülich Centre for Neutron Science at Heinz Maier-Leibnitz Zentrum); NOFERINI, Daria (JCNS, MLS, ESS); COREZZI, Silvia (University of Perugia); ZACCARELLI, Emanuela (Sapienza University); COMEZ, Lucia (University of Perugia); SACCHETTI, Francesco (University of Perugia); PACIARONI, Alessandro (University of Perugia); PETRILLO, Caterina (University of Perugia); ORECCHINI, Andrea (University of Perugia)

**Presenter:** Dr ROSI, Benedetta Petra (Forschungszentrum Jülich)

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