Experimental report

14/02/2020

Proposal: **CRG-2468** **Council:** 4/2017

Title: Combining Neutron Scattering and Single-Molecule Spectroscopy for theStudy of Intrinsically Disordered Proteins

Research area:

This proposal is a new proposal

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Samples: D2O
(CHNO)x
CH6ClN3

Instrument	Requested days	Allocated days	From	To
IN15	4	4	30/03/2018	03/04/2018

Abstract:

The experiment on IN15 resulted in the article

Ameseder et al. Relevance of Internal Friction and Structural Constraints for the Dynamics of Denatured Bovine Serum Albumin, J. Phys. Chem. Lett. 2018, 9, 2469−2473

A general property of disordered proteins is their structural expansion that results in a high molecular flexibility. The structure and dynamics of bovine serum albumin (BSA) denatured by guanidinium hydrochloride (GndCl) were investigated using small-angle neutron scattering (SANS) and neutron spin−echo spectroscopy (NSE). SANS experiments demonstrated the relevance of intrachain interactions for structural expansion. Using NSE experiments, we observed a high internal flexibility of denatured BSA in addition to center-of-mass diffusion detected by dynamic light scattering. Internal motions measured by NSE were described using concepts based on polymer theory. The contribution of residue-solvent friction was accounted for using the Zimm model including internal friction (ZIF). Disulfide bonds forming loops of amino acids of the peptide backbone have a major impact on internal dynamics that can be interpreted with a reduced set of Zimm modes.