Experimental report

08/02/2016

Proposal: 8-04-718 **Council:** 4/2014

Title: Protein relaxation dynamics as affected by biocompatible and biodegradable polymer solvation.

Research area: Biology

This proposal is a new proposal

Main proposer: Daniela RUSSO

Experimental team: Daniela RUSSO
Jose TEIXEIRA
Simone CAPACCIOLI

Local contacts: Tilo SEYDEL
Bernhard FRICK

Samples: Poly(ethyl ethylenephosphate)-N-hydroxysuccinimide , Bovine Serum Albumine

Instrument	Requested days	Allocated days	From	To
IN16B	4	3	25/09/2014	28/09/2014

Abstract:

Protein-polymer conjugates combine the biological activities of proteins with the convenient handling and processability of synthetic polymers. The attachment of synthetic macromolecules to biological molecules has proven to be an efficient strategy to improve protein stability, reduce immunogenicity, developing of biomarkers and drug delivery complexes. Very little is known on the mechanisms leading to such effects, in particular structural and dynamics properties like changes in protein conformation/fluctuation or organization of the polymer shell around the protein. It has been lately demonstrated that the requirement of hydration water it is not necessary in order to enable protein fluctuation in the ps-ns time scales [3]. Hence the urgency to better understand the protein relaxation dynamics as affected by different biocompatible and biodegradable polymers and if a general behaviors apply.

In this experiment, elastic scans on polymer-protein dry and hydrated powders have been investigated. The temperature dependence of Maltose Binding protein conjugated with a polyphosphate polymer has been investigated in the range of 20 - 300K. The samples were completely hydrogenated and partially deuterated. The measurements lasted about 10 hours.

The results of the experiment havebeen published in the following article Russo D.; Plazanet M.; Teixeira J.; Moulin, M.; Härtlein, M.; F. R. Wurm, Steinbach, T.; *Polymer-protein conjugates relaxation dynamics: polymer solvation enhances the overall protein flexibility*, Biomacromol. 17 (2016), 141−147 and cover.

A podcast interview is also available http://pubs.acs.org/page/polymer/audio/index.html