EUROPEAN SYNCHROTRON RADIATION FACILITY

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ESRF

Experiment Report Form

ESRF	TEMPERATURE DEPENDENT CONFORMATIOONAL LANDSCAPE OF INTRINSICALLY DISOR-DERED PROTEINS	Experiment number:
Beamline:	**Date of experiment**: from: 26/11/2010 to: 27/11/2010	**Date of report**: 17/11/2011
Shifts:	**Local contact(s)**: Petra Pernot	*Received at ESRF:*

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The thermal collapse of intrinsically disordered proteins (IDPs) has recently attracted much attention due to its general implication on several fundamental aspects of protein folding. Here, we present an extensive small-angle X-ray scattering study of the thermal behavior of the tau protein, an IDP which play a kay role in the development of many neurodegenerative deseases, like Alzheimer's desease. Our results indicate that the tau protein undergoes a strong thermal collapse, with a reduction in its radius of gyration Rg of about 19% when the temperature is increased in the range 293 K -333 K. This collapse is partially irreversible, as shown by a recovery of only 1/3 of the collapse when the temperature is decreased in the same range [2]. Moreover, as the temperature increases, the size distribution of the protein becomes narrower, suggesting that the thermal collapse phenomenon induces a reduction in the conformational space sampling.The mechanism behind the thermal collapse is currently under debate, and a prominent role of secondary structures has been proposed. We have discussed this hypothesis using data extracted from a recent Molecular Dynamics simulation

of tau, and found indeed that the decrease of Rg is coupled by an increase of secondary structures entailing H-bonds.