

Dynamics of amyloid fibers and their hydration water as studied by neutron spectroscopy

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Protein amyloid fiber formation is the pathological hallmark in various neurodegenerative diseases such as Parkinson's and Alzheimer's. The physico-chemical origin of protein fibrillation, as well as the role that hydration-water might play remain elusive. We combine elastic and quasi-elastic neutron spectroscopy and molecular dynamics simulations on the intrinsically disordered proteins α -synuclein (involved in Parkinson disease) and tau (involved in Alzheimer disease) to investigate both structural and dynamical properties of the protein-hydration water system. One of our findings is an increased water translational diffusion on fiber surfaces, suggesting that hydration-water entropy might be one of the driving forces for amyloid fiber formation.

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