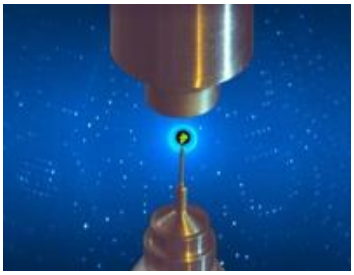

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Dynamical differences between polymorphs of lysozyme amyloid fibrils with different levels of cytotoxicity

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Amyloid fibrils are self-assembled protein filaments, the deposition of which in tissues causes amyloidosis. Recently, much attention has been paid to polymorphism, where proteins form various amyloid fibrils that differ in structure and show different levels of cytotoxicity depending on fibrillation conditions. Since intramolecular motions in the fibrils are considered to play a crucial role in amyloidosis, it is important to understand the dynamical features of their polymorphs. In this study, we focused on the polymorphism of hen egg white lysozyme (HEWL), a model for studying lysozyme amyloidosis in human and prepared D2O hydrated powder samples of two HEWL amyloid polymorphs formed at pH 6 or 2, which are known to show distinct levels of cytotoxicity. We carried out the elastic incoherent neutron scattering (EINS) measurements on these samples using the IN13 spectrometer at ILL in France in the temperature range from 20 K to 310 K. The temperature dependences of the mean square displacements (MSDs) of atomic motions in the proteins were evaluated from the EINS spectra. It was found that whereas the MSD values are similar between the two fibrils at lower temperatures, the fibrils with higher toxicity show significantly larger MSDs at higher temperatures (> 270 K). This implies that the differences in the anharmonic, diffusive local motions are related to the differences in the level of cytotoxicity. At the conference, more detailed results will be presented.

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