

Real-time investigation of Lysozyme crystallization kinetics: a neutron diffraction study

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The isothermal crystallization kinetics of hen-egg-white Lysozyme has been investigated by means of a time-resolved neutron diffraction experiment for almost 3 days, starting from a supersaturated solution of Lysozyme (30 mg/ml, 3 wt % NaCl, pD 4.75 at 298 K) until the growth of crystals, in order to have complementary information about the crystallization kinetics¹. The temporal evolution of the intensity of the Bragg peaks, observed in the neutron diffraction images when a single crystal appears, has been studied. Simultaneously, the analysis of the small angle neutron scattering curves from the Lysozyme solution, during the crystallization process, has been performed. A correlated behaviour between the decrease of the Lysozyme concentration and the increase of the crystallization fraction was observed. The crystallization kinetics was described by means of the Johnson-Mehl-Avrami-Kolmogorov model and parameters compatible with our previous Lysozyme crystallization study have been found². The Lysozyme crystallization under constant neutron flux underlines the known strength of neutrons in studying biological samples without causing radiation damage.

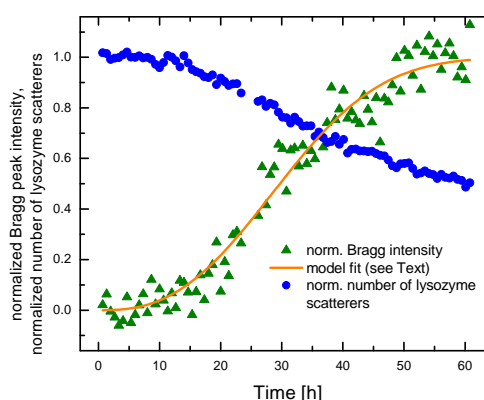


Figure 1 Temporal evolution of the normalized intensity of a single integrated Bragg peak (green triangles) and the normalized number of the Lysozyme scatterers (blue circles). The solid orange line describes the fit to the data obtained with the JMAK model.

1. Longo, M., Heigl, R. J. & Schrader, T. E. Real-time investigation of Lysozyme crystallization kinetics: A neutron diffraction study. *J. Cryst. Growth* **576**, 126362 (2021).
2. Heigl, R. J. *et al.* Crossover from a Linear to a Branched Growth Regime in the Crystallization of Lysozyme. *Cryst. Growth Des.* **18**, 1483–1494 (2018).

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