**116b Protein Crystallization under Medically Relevant Conditions**

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Protein crystallization is significant in both biotechnology and biomedical applications. In biotechnology, crystallization is essential for determining the structure of both native and synthesized therapeutically important proteins. It can also be used as a final purification step and as a stable form for protein storage. With regard to biomedical systems, protein crystallization appears to be involved in the development and manifestation of certain human diseases.

In biomedical applications, small changes in temperature from one tissue to another[1] or in a particular tissue with time[2] may have a significant influence on the crystallization or precipitation of proteins that occur in living systems. Therefore we have developed an apparatus that facilitates multiwell microbatch crystallization experiments on a thermal gradient that enables (1) multiple batch crystallization experiments at various temperatures and solution conditions in parallel and (2) quantitative monitoring of crystal growth without disturbing the progress of an experiment for observation.

There are diseases such as sickle cell anemia and certain cataracts that belong to the type of protein condensation diseases in which the pathology is caused by a loss of protein solubility. In this research a special type of protein condensation, namely protein crystallization, is examined using apoferritin as a model system. Protein crystallization experiments are performed *in vitro* to determine the short-range protein-protein interactions and the physiological factors influencing them, such as variations in temperature. The correlation to the dilute protein-protein interactions in the liquid phase are made by measuring the second virial coefficient of solutions via static light scattering (SLS).

Compared to the crystallization device used, SLS has no high-throughput capabilities; therefore the number of experiments conducted is limited to a few of the most significant, cases. Of particular significance are the solution conditions closely neighboring the conditions of apoferritin crystallization, that is, conditions under which crystallization starts to occur.

The presented work will evaluate the correlation between solution thermodynamics and crystallization outcome of a medically relevant protein under medically relevant conditions. The research is designed to determine the factors influencing the occurrence of protein crystallization diseases and eventually other protein condensation diseases.

(1)Werner, J.; Buse, M., Temperature profiles with respect to inhomogneity and geometry of the human body. *Journal of Applied Physiology* 1988, **65**(3), 1110–1118. (2)Alio, J.; Padron, M., Influence of Age on the Temperature of the Anterior Segment of the Eye—Measurements by Infrared Thermometry. *Ophthalmic Research* 1982, **14**(3), 153–159.