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Crystallization of ferritin directly from E. Coli cell lysate and structure determination

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Protein crystallography is a powerful method to determine high resolution structures of biomacromolecules. Recently, they found various applications as solid materials in catalysis, enzyme storage, biotechnology etc. Therefore, method of bulk crystallization is necessary. However, purification and crystallization are the challenges in many proteins. Recently, in-cell protein crystallization has attracted attention as it does not require any purification steps.[2] Despite many promises, such crystallization is very specific and limited to only a few proteins (<10). Since the mechanism of in-cell crystallization is unclear, applications to new recombinant proteins become unsuccessful. Similarly, the newly developed cell-free crystallization method is also limited to few proteins.[3] Therefore, establishing an alternate crystallization method directly from cells would be interesting. This presentation will describe a methodology to crystallize ferritin cage as a model protein directly from E. Coli cell lysate without any purification (Fig. 1). We achieved X-ray diffractable microcrystals (~10 μm) within half day and determined the structure at 2.8 Å resolution using microfocus synchrotron beamline. Using high-speed AFM, we visualized the orientation of ferritins on the crystal surface. Thus, our demonstration provides an important message on protein crystallization for next generation structural biology.

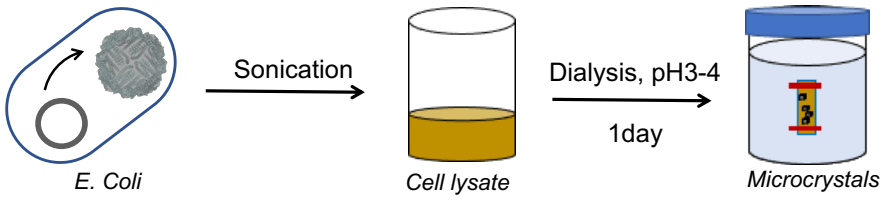

Figure 1: Method of ferritin crystallization directly from E. Coli cell lysate.

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