S02-2 Structure and self-assembly of negatively supercharged protein cages

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In nature, “protein cages” such as viral capsids, ferritin, and shell proteins of carboxysome play important roles including delivery, storage and even production of biomolecules. Recently, these protein cages have been genetically/chemically engineered or artificially designed to have tailored structures and encapsulation properties that may be useful for various applications. For example, a few point mutations were introduced on a lumenal surface of lumazine synthase (LS), which self-assembles into a regular shell-like structure. The resulting LS cage possessing a negatively supercharged internal surface can efficiently encapsulate cargo proteins with a positively charged tag. We show here self-assembly of the supercharged LS can be controlled by template particles and ionic strength based on electrostatic interactions. We also report two unprecedented porous structures of the engineered LS cages that were elucidated by using cryo-electron microscopy single-particle reconstruction.

I started working in Japan about a year ago after spending 6 years of research in the US (University of Texas at Austin, PhD) and 5 years in Switzerland (ETH Zurich, PD). In addition to the talk mentioned above, I would like to look back on my research experiences in these countries and share what I think about studying abroad.