

## SMS Fall Seminar Series

Friday Sept 9 | 2:30pm | Biodesign Auditorium

### Build it and They (Applications) Will Come: The Design of Novel Protein Cages and Related Materials

Nature is replete with examples of sophisticated protein assemblies carrying out diverse cellular functions. Many of these are based on the self-assembly of one or a few types of protein subunits into architectures exhibiting high degrees of symmetry.

With the diverse functions of natural systems serving as motivation, symmetry has provided guiding principles for designing novel protein architectures in the laboratory, most notably protein cages modeled according to the Platonic solids: tetrahedron, cube, icosahedron. Following the invention of designed protein cages by Padilla et al. in 2001, methods and applications have flourished. Improving methods and remaining challenges in design will be discussed, along with new applications for self-assembling protein architectures in areas ranging from poly-enzymatic materials to cryo-EM scaffolding to systems biology and cellular applications.

## Todd O. Yeates, PhD

*Department of Chemistry and Biochemistry, University of California Los Angeles*  
*Director, UCLA-DOE Institute for Genomics and Proteomics*

Todd Yeates earned his PhD in 1988 at UCLA working on early structures of membrane proteins. He then moved to The Scripps Research Institute to do postdoctoral research on the structure of poliovirus. Yeates returned to UCLA in 1990 to join the Faculty in the Department of Chemistry and Biochemistry. His interdisciplinary research has bridged the areas of molecular biology, structure, and mathematical and computational methods. His laboratory's early research laid out methods for solving complex problems in X-ray diffraction data analysis, and for extracting genome wide functional information about protein function using computational methods.

His recent work has focused on large protein assemblies. His laboratory worked out a structural understanding of carboxysomes and other microcompartments that serve as protein-based organelles in bacterial cells. His laboratory also pioneered methods for designing novel protein assemblies, based on principles of symmetry, to create protein cages and other geometrically ordered protein materials. Designed assemblies of this type are finding wide applications in medicine and nanotechnology.

Yeates is currently Director of the UCLA-DOE Institute for Genomics and Proteomics.

