

CAL13-2013-020008

Abstract for an Invited Paper
for the CAL13 Meeting of
the American Physical Society

Proteins as Nanolegos

DANIEL COX, University of California - Davis

Proteins can self-assemble into remarkable structures of high geometric symmetry both inside organisms and, with some intuition into design principles, in a cell free environment. After a brief survey of the spectrum of naturally occurring self-assembled protein scaffolds, from viral capsids to spider silk to biofilms, I will discuss engineered protein structures including remarkable designed geometric solids and assemblies of so called beta solenoid proteins. These latter proteins have extraordinarily symmetric geometric cross sections, and arise in such contexts as anti-freeze function and bacterial anti-biotic resistance. These protein assemblies are remarkably robust to environmental extremes in temperature and chemistry, and could have played a role in boosting the evolution of nucleic acids for early life on earth. They can also play a role in tissue engineering and, potentially, nano-manufacturing.