Holland Lab Postdoctoral Position in Natural Soft Matter, Dept. of Chemistry, SDSU

A DOD-funded postdoctoral position is available at San Diego State University in the general area of exploring atomic and molecular level structure and dynamics in spider silk proteins with solution and solid-state NMR together with cryo-TEM and molecular dynamics (MD) simulations. Developing a fundamental understanding of how spider silk proteins assemble into high performance biomaterials will impact applications in the defense, medical and space exploration sectors. The biochemical transformation processes that take place to synthesize protein-based materials remains a complicated problem with numerous unanswered questions. These structural evolutions are mostly unexplored due to the lack of combined experimental data that can link the atomic, molecular and meso- length scales. The aim of this research is to harness recent advances in magnetic resonance, cryo-TEM and simulation to develop models for the transformation of soluble silk proteins to materials that out-perform man-made systems.

The successful applicant will become part of a large multi-university team to investigate and characterize spider silk structural biology from solution through the solid, fibrous material. The applicant must possess outstanding communication skills and be able to clearly communicate the scientific significance of this work to colleagues with backgrounds in theory, chemistry, biology and materials science. The applicant will be responsible for acquiring and analyzing multi-dimensional, multinuclear solution and magic angle spinning (MAS) solid-state NMR data of spider silk proteins. NMR data will be combined with data from cryo-TEM imaging and tomography and MD simulations to begin connecting the atomic, molecular and nanometer length scales for an improved understanding of hierarchical silk formation. Extensive image simulation with dynamic models provided by computation will be integrated into the data analysis and interpretation.

Basic Qualifications:

- A Ph.D. in physics, chemistry, materials science or related disciplines.
- Experience in solution and MAS solid-state NMR of proteins.
- Experience in analyzing NMR data with TOPSPIN, NMRPipe, Sparky, TALOS-N, CS-ROSETTA, etc.
- Experience in MATLAB programming to combine and analyze data sets from multiple techniques.

Preferred Qualifications:

- Experience in cryo-TEM tomography of protein oligomers.
- Experience in MD simulations of proteins.

Contact gholland@sdsu.edu for more info.