



CHEMISTRY SEMINAR 291

Programming Photonics with Soft Materials

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Los Alamos National Lab

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ABSTRACT

Polymers self-assemble into a wide range of complex structures, and these "squishy" molecules can also direct the assembly of other materials. This talk will explore novel photonic materials scaffolded by two classes of polymers. DNA can be used to stabilize silver clusters with sizes and optical properties selected by DNA sequence. The biopolymer scaffold imparts a unique, elongated cluster geometry that leads to a wide range of possible fluorescence wavelengths. Thus far, design tools for DNA sequences that select clusters with particular fluorescence wavelengths are limited. I will show that by marrying high throughput experiments with data mining and machine learning, we can discover DNA base motifs that are predictive of the silver clusters a DNA strand may stabilize, and these methods are useful tools for designing DNA templates that stabilize fluorescent silver clusters with desired fluorescence wavelengths. The second part of the talk turns to photonic materials templated by synthetic polymers. Certain block copolymer amphiphiles with low molecular weights are surrogates for lipids, forming biomimetic membranes that are being explored for applications ranging from drug delivery to photonics. I will discuss our ongoing work using these lipid-like polymers to organize and control interactions among optically active nanoparticles and among chromophores.

BIO:

Stacy Copp is a Hoffman Distinguished Postdoctoral Fellow and UC President's Postdoctoral Fellow at Los Alamos National Laboratory's Center for Integrated Nanotechnologies, where she works with Prof. Gabriel Montano and Prof. Atul Parikh. Stacy's research focuses on novel photonic materials scaffolded by soft matter. She is studying how amphiphilic polymers with properties that mimic biological lipids can direct assembly nanoparticles and chromophores in polymer membranes. Stacy also studies DNA-stabilized fluorescent silver clusters using machine learning and other data-driven techniques. Stacy earned her BS in Physics and Mathematics from the University of Arizona in 2011 and her PhD in Physics from UC Santa Barbara in 2016, where she worked in the group of Elisabeth Gwinn.