4CS19-2019-000178

Abstract for an Invited Paper
for the 4CS19 Meeting of
the American Physical Society

High-throughput approaches to understanding photoluminescence of DNA-stabilized silver clusters

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Small clusters of 10-30 silver atoms with bright photoluminescence can be stabilized using DNA. The templating DNA sequence selects the size and shape of the silver cluster, resulting in optical properties that vary widely depending on DNA sequence. For instance, photoluminescence wavelengths of DNA-stabilized silver clusters can be tuned from about 500 nm up to at least 1000 nm by choice of DNA template sequence. Because the space of possible DNA sequences is large and the connection between sequence and optical properties is complex, we are using high-throughput methods to understand how the size and photoluminescence of a DNA-stabilized silver cluster is determined. I will present our studies of the excitation and emission spectra of several hundred unique DNA-stabilized silver clusters. Despite the great diversity of excitation and emission energies, overall trends of these measured quantities suggest universal mechanisms for the fluorescence process within DNA-stabilized silver clusters. These findings may lead to a better understanding of the fundamentals of these important biosensors.