Exploring the NIR region of DNA-stabilized silver nanoclusters

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DNA-stabilized silver nanoclusters (DNA-AgNCs) have lately attracted attention due to their intriguing properties. The emission wavelength of DNA-AgNCs can be tuned from the visible to the NIR region by varying the DNA sequence and the number of reduced silver atoms. In addition to the wavelength tunability, high brightness, photostability, water solubility and bio-compatibility, as well as non-toxicity for mammalian organisms, are interesting features of DNA-AgNCs. Therefore, they are promising candidates as sensors and fluorophores in life sciences, especially the NIR-emitting DNA-AgNCs could play an important role in future biomedical applications.

Recently, two DNA-AgNCs emitting in the NIR range were investigated. These clusters are characterized by multiple absorption features in the visible region and emit around 811 nm (DNA811-AgNC) and 841 nm (DNA841-AgNC). The study of both DNA-AgNCs also revealed previously unobserved photophysical behavior for this class of emitters. The fluorescence quantum yield and decay time of DNA841-AgNC can be increased upon consecutive heating/cooling cycles. Furthermore, a DNA-AgNC population (as part of the DNA811-AgNC sample) showed green and near-infrared emissive states with nanosecond and microsecond decay times, respectively.

These two examples highlight the need to investigate the presence of red-shifted microsecond emission for this class of emitters, and open up new research opportunities in fluorescence imaging and sensing using noble metal clusters.