291d Dynamic Nanoparticle Temperature Sensors

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Dynamic new smart materials with new functionalities can be created from nanoparticle (NP) assemblies. Currently, most assemblies built from NP building blocks like bioconjugates and hybrid nanocolloids are predominantly static, i.e. retain a conformation defined by synthetic procedure with limited flexibility in adapting to its environment without drastic restructuring. Dynamic NP conjugates offer many advances in sensing technology because their optical properties are linked to their structure. Recent advances in conjugation techniques offer the promise of being able to create dynamic nanoscale sensors made from assemblies of NPs and flexible polymers whose optical properties vary in response to the environment. One such example is an Au NP, polyethylene glycol (PEG), and CdTe NP conjugate whose optical properties vary reversibly with temperature. This paper will discuss this nano-thermometer, including its temperature sensing performance and the plasmon resonance and exciton-plasmon mechanisms that governs its behavior.