Recent Discoveries in Colloidal Nanoplasmonics

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Nanoplasmonics can be defined as the control of the flow of light by objects that are smaller than the light wavelength. The most common nanomaterials for nanoplasmonics are metal nanoparticles, which display intense absorption and scattering in the visible and near-IR due to localized surface plasmon resonances (LSPR). Such resonances can be tuned through the size and shape of the nanoparticles, and therefore optimization of fabrication methods has been an active area of research, where many concepts are still under debate and monodispersity is still an issue, meaning that non-specific broadening of the LSPR bands is thought to be inherent to colloidal systems. Recent progress toward improving synthesis of "optically monodisperse" plasmonic colloids will be presented.

On the other hand, the assembly of nanoparticle building blocks can be exploited toward the amplification of the properties of the components and/or the generation of new features unique to the ensemble. A novel concept has been recently reported in which mixed nanoparticle (e.g. gold and iron oxide) mono- and multi-layers can be generated as crystal-like films on top of a liquid. Upon removal of the iron oxide particles, a lattice of gold nanoparticles remains with a specific internal architecture. Among numerous other applications, these open crystalline structures may help creating porous films with a mesh of predefined holes where analytes can be trapped and identified by SERS.

References:

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