Abstract Submitted
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Liquid Crystal Mediated Nano-assembled Gold Micro-shells[1] MAKIKO QUINT, SOM SARANG, University of California Merced, DAVID QUINT, KERWYN HUANG, Stanford University, AJAY GOPINATHAN, LINDA HIRST, SAYANTANI GHOSH, University of California Merced — We have created 3D nano-assenbled micro-shell by using thermotropic liquid crystal (LC), 4-Cyano-4'-pentylbiphenyl (5CB), doped with mesogen-functionalized gold nanoparticles (AuNPs). The assembly process is driven by the isotropic-nematic phase transition dynamics. We uniformly disperse the functionalized AuNPs into isotropic liquid crystal matrix and the mixture is cooled from the isotropic to the nematic phase. During the phase transition, the separation of LC-AuNP rich isotropic and ordered 5CB rich domains cause the functionalized AuNPs to move into the shrinking isotropic regions. The mesogenic ligands are locally crystalized during this process, which leads to the formation of a spherical shell with a densely packed wall of AuNPs. These micro-shells are capable of encapsulating fluorescence dye without visible leakages for several months. Additionally, they demonstrate strong localized surface plasmon resonance, which leads to localized heating on optical excitation. This photothermal effect disrupts the structure, releasing contents within seconds. Our results exhibiting the capture and optically regulated release of encapsulated substances is a novel platform that combines drug-delivery and photothermal therapy in one versatile and multifunctional unit.

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Makiko Quint
University of California Merced

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