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**Directed assembly of hierarchical light-harvesting complexes using virus capsid scaffolds and DNA origami tiles** DEBIN WANG, Lawrence Berkeley National Laboratory, STACY CAPEHART, University of California, Berkeley, SUCHETAN PAL, MINGHUI LIU, Arizona State University, JOLENE LAU, Lawrence Berkeley National Laboratory, HAO YAN, Arizona State University, MATTHEW FRANCIS, University of California, Berkeley, JIM DEYOREO, Lawrence Berkeley National Laboratory, LBNL TEAM, UCB TEAM, ASU TEAM
— Directed assembly of nanostructures with molecular precision is of great importance to develop an insightful understanding of assembly pathways and dynamics as well as to derive new functionalities. In this work, we explore the use of virus capsids and DNA origami tiles as 3D scaffolds and 2D templates for directed assembly of light-harvesting molecules and plasmonic gold nanoparticles to achieve tunable photoemission. Bacteriophage MS2 virus capsids with well-defined spherical macromolecular structures are genetically modified to provide predictable steric arrangements of light-harvesting molecules. DNA origami tiles act as programmable planar templates to provide higher-order organization of oligonucleotide-functionalized light-harvesting capsids and plasmonic gold nanoparticles. The direct observation of distance dependent photoluminescence emission is carried out by our correlative approach combining atomic force microscopy and confocal fluorescence microscopy, which is in good agreement with our numerical simulation and theoretical calculation. This work will facilitate the construction of multicomponent biological-metal hybrid plasmonic nanostructures for nanophotonics and biosensing applications.

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