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Self-assembly of tetrahedral plasmonic nanoclusters for optical metafluids NICHOLAS SCHADE, Department of Physics, Harvard University, VINOTHAN MANOHARAN, School of Engineering and Applied Sciences and Department of Physics, Harvard University — We direct the assembly of clusters of gold nanospheres that behave as nanoscale electromagnetic resonators. We use spherical gold nanoparticles that are exceptionally smooth, monocrystalline, and monodisperse. These particles exhibit highly reproducible scattering spectra compared with gold colloids that are available commercially. We mix these positively charged particles with negatively charged dielectric particles. The gold particles stick to the dielectric particles permanently and randomly in a process that can be modeled mathematically as "random parking," a type of non-equilibrium self-assembly. By controlling the particles' sizes, stoichiometry, and interactions, we maximize the yield of tetrahedral clusters, the ideal structures for isotropic metamaterials. We measure the optical properties of these structures with dark-field spectroscopy to characterize their suitability as building blocks for a bulk, isotropic, optical metafluid.

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