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Research Article

Freestanding, Freeform Metamolecule Fibers Tailoring Artificial Optical Magnetism

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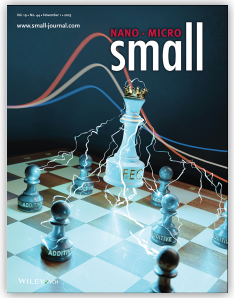
Abstract

Metamolecule clusters support various unique types of artificial electromagnetism at optical frequencies. However, the technological challenges regarding the freeform fabrication of freestanding metamolecule clusters with programmed geometries and multiple compositions remain unresolved. Here, the freeform, freestanding raspberry-like metamolecule (RMM) fibers based on the directional guidance of a femtoliter meniscus are presented, resulting in the evaporative co-assembly of silica nanoparticles and gold nanoparticles with the aid of 3D nanoprinting. This method offers a facile and universal pathway to shape RMM fibers in 3D, enabling versatile manipulation of near- and far-field characteristics. In particular, the authors demonstrate the ability to decrease the scattering of the millimeter-scale RMM fiber in visible spectrum. In addition, the influence of electric and magnetic dipole modes on the directional scattering of RMM fibers is investigated. These experiments show that the magnetic response of an individual RMM can be controlled by adjusting the filling factor of gold nanoparticles. The authors anticipate that this method will allow for



Early View

Online Version of Record before inclusion in an issue

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References Related Information

unrestricted design and realization of nanophotonic structures, surpassing the limitations of conventional fabrication processes.

Conflict of Interest

The authors declare no conflict of interest.

Open Research

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Supporting Information

Filename	Description
smll202303749-sup-0001-SuppMat.pdf745.8 KB	Supporting Information

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Metasurfaces-Driven Hyperspectral Imaging via Multiplexed Plasmonic Resonance Energy Transfer

Inki Kim, Hongyoon Kim, Seungyeon Han, Joohoon Kim, Yangkyu Kim, Seonghyeon Eom, Aleksandr Barulin, Inhee Choi, Junsuk Rho, Luke P. Lee

Advanced Materials

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