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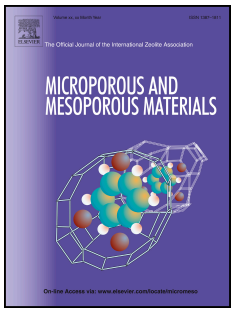


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# An Integrated Function System using Metal Nanoparticle@Mesoporous Silica@Metal-Organic Framework Hybrids

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**Abstract**

Multifunctional triple-compartment hybrids consisting of Au nanoparticle (NP)@mesoporous silica (*m*$SiO_2$)@metal-organic framework (MOF) have been successfully synthesized via selective nucleation and growth on the surface of NP@*m*$SiO_2$ nanostructures. Most importantly, these hybrids possess unique dual independent pores with different pore sizes based on *m*$SiO_2$ and MOF for loading of larger organic molecules and sieving of smaller organic molecules. Through characterization of the pore properties of both porous materials, triple-compartment hybrids can be employed in sensing materials on the basis of the fluorescence properties of the doped fluorescent molecules within the *m*$SiO_2$ phase and the molecular sieving effect of MOF. These hybrid nanostructures also show plasmonic properties due to the Au NPs.

**Keyword**

Mesoporous silica, Metal-organic frameworks, Inorganic nanoparticles, Nanocomposites, Fluorescence sensor