Versatile Approaches of Holographically Featured Layer-Controllable FCC Nanostructures for Highly Sensitive SERS Applications

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Compared to the conventional multi-beam interference lithography, prism holographic lithography (HL) is a simple and rapid method for generating large-area periodic 3D nanostructures using the optical interference of created multiple coherent light beams from a single laser beam via a novel prism. Especially, the number of layers of the resulting face-centered cubic (FCC) structures derived from the HL using specially designed prism can be simply controlled by varying the thickness of the photoresist film. Here, we demonstrate versatile approaches of these layer-controllable HL-featured FCC structures for surface enhanced Raman scattering (SERS)-based sensing applications, including usage as metal deposition or etching masks, and templates for metal deposition combining with proper other techniques. Overall, our HL-featured nanostructures therefore hold promise for robust, simple, and cost-effective chemical or biomolecule sensing applications, when incorporated into microfluidic devices via integration with conventional photo-lithography.