

Photonic Crystal Microparticles Fabricated by Interference Lithography for Surface-Enhanced Raman Scattering

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We report the novel method for fabricating surface-enhanced Raman scattering (SERS) particle based on silver nanoparticles (NPs) decorated photonic crystal microparticles with internal woodpile structures by combining the hot-embossing process and prism holographic lithography (HL). First, microarrays of disk shape are obtained by hot-embossing process using PDMS elastomeric mold. Prism HL induces internal woodpile structure with various reflectance peak positions by controlling exposure time during the process. Finally, we can obtain free-floating photonic crystal microparticles after removing residual layer of microarrays and releasing from the substrates by reactive ion etching and pre-coated sacrificial layer respectively. And silver NPs are decorated on these free-floating HL microparticles by electro-less deposition. The resulting microparticles exhibit highly enhanced sensitivity of SERS because of the 3D porous structure.