Fabrication of nanoarchitectures with anisotropic geometries and properties using controllable holographic lithography

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Recently, anisotropic nanostructures with precise orientation or often sharp corners are in the limelight because of their novel physical or chemical properties, which have a potential for various applications. However, a delicate control of the isotopicity and a large-area fabrication with reproducibility remain still major issues.
Here, we report the highly uniform polymeric and metallic nanostructure arrays with tunable isotopicity via prism holographic lithography (HL). The isotopicity can be easily tuned by controlling the prism position on the sample stage, which induce intensity variation of the split four beams, during the HL. The anisotropic metallic nanostructures with the good homogeneity can be fabricated using HL-featured porous polymeric structures as milling masks. Such metallic nanostructure arrays, after removing the polymeric mask, show two different optical properties depending on the polarization direction, which are longitudinal and transverse directions. Furthermore, two-direction anisotropic wetting by anisotropic polymeric nanowalls is demonstrated.