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Title:Selective enhancement of infrared absorption with metal hole arrays
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Abstract:We use a surface-enhanced infrared absorption (SEIRA) spectroscopy, a useful sensing and surface analysis method complimentary to the Raman scattering spectroscopy, for the individual enhancement of specific molecular vibration bands and fingerprinting of molecular vibrations. SEIRA spectroscopic measurement using the metal hole array (MHA) is demonstrated with high spectral selectivity. The molecular IR absorption peaks are enhanced up to 10 times at the transmission peak of MHA structure when electromagnetic field enhancement is localized on the walls inside the holes. Experimental and numerical simulations results are in a good qualitative agreement. Selective IR band enhancement can be used for identification of specific molecules within complex mixtures and it can be extended to the longer wavelengths at THz molecular bands. © 2012 Optical Society of America.
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