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Abstract: We report an anomalous field enhancement of terahertz transmission in metallic, hybrid plasmonic geometries. The integration of a rectangle particle in the hole not only results in an eight times normalized transmittance compared to that of the hole-only counterpart, but also tailors polarization-dependent transmission discrepancy encountered in arrays of rectangular holes. In addition, plasmonic structures made of metallic rings integrated into the subwavelength holes are investigated. The emergence and the interplay of various resonances sustained by the hybrid plasmonic samples are elucidated. To reveal a coherent physical picture, relevant dimensions of the samples are modified and their impact on the resonance properties is analyzed. The understanding of the interplay of various resonances will foster applications which require plasmonic substrates to exhibit simultaneously resonances at well-defined frequencies and line widths.

Keywords: Terahertz frequencies, Surface plasmons, Enhanced transmission