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Plasmonic halos: optical surface plasmon drumhead modes FAN YE, MICHAEL J. BURNS, MICHAEL J. NAUGHTON, Boston College, Department of Physics, 140 Commonwealth Avenue, Chestnut Hill, MA, 02467 — We present the discovery and systematic study of a novel optical phenomenon, wherein optically-pumped surface plasmons on circular silver microcavities form confined drumhead modes that, under off-resonant conditions, transform to colorful far field radiation at their circumferential boundaries. We call this phenomenon the "plasmonic halo." We demonstrate both experimentally and theoretically that such circular microcavities integrated with perimeter step gaps can generate surface plasmon cavity modes, and modulate optical transmission/emission through/from the device, yielding the plasmonic halo effect. Via the tuning of geometric and/or material parameters, optical properties of this device can be manipulated in the visible range, leading to promising applications in biomedical plasmonics, dielectric constant sensing and discrete optical filtering, among others.

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