Electron energy-loss spectroscopy of branched gap plasmon resonators - DTU Orbit

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The miniaturization of integrated optical circuits below the diffraction limit for high-speed manipulation of information is one of the cornerstones in plasmonics research. By coupling to surface plasmons supported on nanostructured metallic surfaces, light can be confined to the nanoscale, enabling the potential interface to electronic circuits. In particular, gap surface plasmons propagating in an air gap sandwiched between metal layers have shown extraordinary mode confinement with significant propagation length. In this work, we unveil the optical properties of gap surface plasmons in silver nanoslot structures with widths of only 25 nm. We fabricate linear, branched and cross-shaped nanoslot waveguide components, which all support resonances due to interference of counter-propagating gap plasmons. By exploiting the superior spatial resolution of a scanning transmission electron microscope combined with electron energy-loss spectroscopy, we experimentally show the propagation, bending and splitting of slot gap plasmons.

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