Chiral plasmonic nanocommas

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Light manipulation at nanoscale is one of the most promising features of plasmonic nanomaterials, which offers a number of exciting applications. Interaction of light with electrons in carefully designed metallic nanostructures with particular size and shape allows one to amplify low spectroscopic signals, to probe the dielectric properties of the adjacent media, to initiate chemical transformation, etc. One of the fast-growing areas of nanoscience now deals with the development of chiral plasmonic nanomaterials, which might be used in new photonic devices, including highly efficient enantioselective sensors.

A number of top-down fabrication techniques exists which allow manufacturing of various 2D- and 3D chiral plasmonic structures, such as Electron Beam Lithography or Focused Ion Beam etching. However, these approaches generally suffer from low throughput and high cost, both hampering their broad application. Therefore, robust and cost-effective fabrication techniques are needed for efficient use of plasmonic nanostructures.

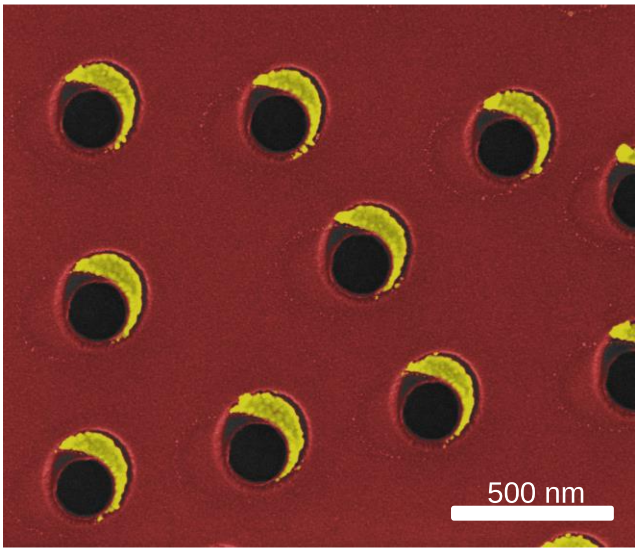

Figure 1. Chiral Gold nanoparticles with comma-like shape fabricated by IRCL.

This presentation will feature new fabrication procedure based on In-situ Resist Colloidal Lithography approach [1] to pattern large-area substrates with chiral crescent nanoparticles, as presented in Fig.1. Optical properties of these particles, including the optical extinction and circular dichroism spectra, will be presented. Charge distributions for each LSPR mode, visualized by finite-difference time-domain simulations as well as the calculated distribution of the optical chirality density will be demonstrated.

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References:
[1] Vladimir E. Bochenkov. AIP Conf. Proc., **1874**, 030004 (2017).