Tailoring gold bipyramids for photothermal applications

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Plasmonic nanoparticles with five-fold symmetry offer an important advantage over their single-crystalline analogs due to their superior structural stability. The concentration of Au seeds is the sole factor determining the size and/or aspect ratio, and thus the optical properties of the nanoparticles. As a result, varying nanoparticle volumes while keeping their optical spectra unchanged remains a synthetically non-trivial task. We expand the chemical space for the synthesis of highly monodisperse penta-twinned gold bipyramids, achieving yields approaching 100%. In particular, we found that the combination of bromide ions and seed concentration allows for tailoring the dimensions and aspect ratio of gold bipyramids [1] , enabling modulation of nanoparticle volumes while keeping their optical spectra unchanged. By exposing the nanoparticles to a constant position of the plasmon band under NIR laser irradiation, we found that larger AuBPs exhibited lower efficiencies, due to increased scattering contributions [2] .

Keywords:
Precision Nanochemistry, Gold nanoparticles, Thermoplasmonic

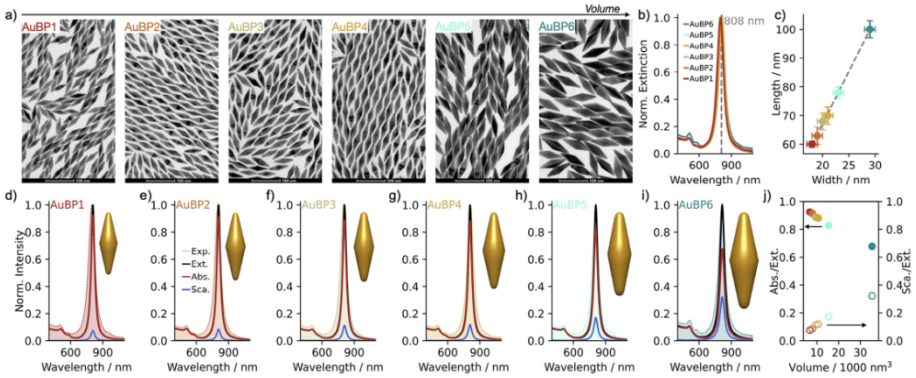

Figure 1. a) TEM images of AuBPs with increasing volume and constant aspect ratio. b) UV-Vis-NIR of samples with the maxima of LSPR at 808 nm. c) Length vs. width. d–j) Optical properties of AuBPs showing the increase of extinction contribution with increasing volume.

References:

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