Centrifugal Isolation of Faceted Gold Nanoparticles

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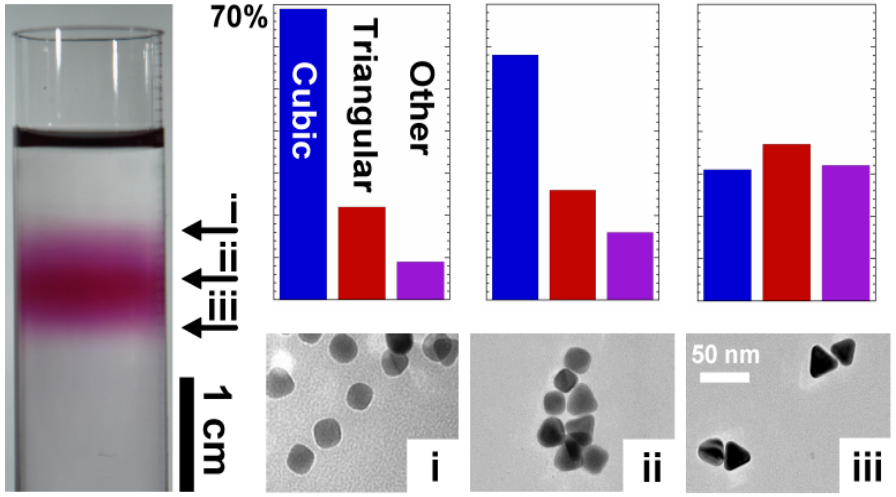
Highly-refined gold nanoparticle (AuNP) populations are important for applications in catalysis, plasmonics, and nanomaterials growth. To date, attempts to achieve uniform AuNPs have relied on synthetic control or post-synthetic centrifugal processing where differences in the particle mass and aspect ratios provide the driving force for separation. Here, we demonstrate an alternative technique that reversibly modifies the sedimentation coefficients of AuNPs possessing different crystallographic surface facets that would otherwise be indistinguishable due to their similar densities, masses, and aspect ratios, thereby achieving unprecedented control over AuNP size and shape monodispersity.



By exploiting the preferential affinity of the surfactant cetyltrimethylammonium bromide (CTAB) for the Au(100) surface, faceted gold nanoparticles (both cubic and triangular) are separated from their nonfaceted (i.e., spherical) counterparts via centrifugal processing.

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