

### Elaborate Design of Multifunctional Hybrid Asymmetric Nanoparticles

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Increasing attention has been given to the fabrication of colloidal particles with asymmetric geometries and hybrid compartments, because they may have comprehensive and unique properties which are not obtained from the symmetric particles with single element. Here, we have described a fabrication strategy for hybrid asymmetric nanoparticles which had biomimetic design that inspired from bacteriophage and human sperm cell. Similarly with natural objects, asymmetric nanoparticles had discrete domains of different materials with distinct functionalities such as fluorescence, magnetism and plasmonics via combination of colloidal lithography, reactive ion etching and metal deposition process. The hybrid particles composing inorganic head and polymeric tail were tunable in aspect ratio of tail and combination of functions by adjusting the thickness of polymeric film and functional nanoparticles in polymeric film underneath the colloidal particles. These nanoparticles could be utilized for studying the geometric effect on cellular uptake of biomimetic nanoparticles, cellular imaging and cell separation agent.