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Gold nanospirals on colloidal gold nanoparticles

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Abstract: Synthesis of asymmetric nanostructures has always been a great challenge. In particular, there are only limited approaches for growing spiral nanowires in solution, and almost all of them require templates. Here, as a step in advancing the synthetic capability at the nanoscale, we report a wet chemistry template-free approach for growing hybrids spiral gold nanowires. The spiral gold nanowires were grown from the surface of colloidal gold nanoparticles, forming hybrid Au nanostructures. As an application of the active surface growth mechanism, the mechanistic understanding enables systematic adjustment of the nanowire morphology. The length and width of the spiral nanowires could be readily adjusted. Furthermore, the number of spiral nanowire on each Au nanoparticle, could be tuned by the pre-hydrolysis of the surface modification reagent. Such versatile system allows creation of complex nanostructures like the octopus-like and spider-like Au hybrids.

Keywords: spirals, colloidal synthesis, Au nanoparticles, nanohybrids, nanowires

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