Negative-type Photolithography of Functionalized Gold Nanoparticles

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Gold nanostructures have been studied extensively for their potential applications in areas, such as catalysis, optics, electronics and biological devices. In particular, the ability to generate patterns of various metals on a solid surface is important for optoelectronic technology and biotechnology. Patterning of nanoparticle assemblies can be achieved using a variety of methods. These include microcontact printing, micromolded hydrogel stamping and scanning probe dip-pen nanolithography.

In recent, various methods have been reported for the patterning of nanoparticles on the templates such as dip-pen, Langmuir-Schaeffer(LS), layer-by-layer(LbL) and microcontact printing. However, these methods require high fabrication costs of systems, and time-consuming fabrication steps.

In this study, thiol-stabilized gold nanoparticles ranging in size from 2 to 13 nm were synthesized using a two-phase reduction method. The thiol-stabilized gold nanoparticles formed micropatterns on a glass substrate through UV irradiation and chemical oxidation. Overall, the micro-pattern obtained through this simple procedure has great potential in the electronics industry.