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Self-Assembly of Nanoparticle Wires JIAJIE DIAO, George Washington University, JAIME HUTCHISON, George Washington University, JIANWEI SUN, George Washington University, MARK REEVES, George Washington University — We present a technique to make low-dimensional nanoparticle structure, Evaporation-Driven Colloidal Deposition (EDCD), which is developed from a similar deposition method for preparing nanoparticle thin films. A substrate immersed into a nanoparticle suspension is gradually exposed to air by evaporation. Due to the interface forces, nanoparticles at the liquid-air-substrate interface subsequently deposit on the liquid-air interface along the air-liquid boundary. While uninterrupted evaporation results in a continuous nanoparticle thin film, evaporation followed by rapid removal of a small quantity of the suspension leads to the formation of a nanparticle wire, and successive removal of the suspension leads to a stepwise formation of nanoparticle wires on the substrate. The width of each wire depends on the deposition time, whereas the distance between two adjacent wires is controlled by the volume of the suspension removed at each step. This method is suitable for both metallic and nonmetallic nanoparticles. The current to voltage response and its temperature dependency of gold nanoparticle wires made by EDCD are shown.

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