Sub-millimeter Scale Transfer of Nanoparticles onto Several Substrates by Using Capillary Force

장지한, 이재경, 강태욱†
서강대학교
(twkang@sogang.ac.kr†)

Bottom-up fabrication using self-assembly of nanoparticles (NPs) at liquid interface and following Langmuir deposition has been widely used in the application ranging from molecular detection to energy harvesting. However, fragility of floating NP monolayer against mechanical stress causes cracks or voids which hampers its uniformity. It is also limited to deposit onto a small area with complicated geometry. Here, we propose a fabrication method through sub-millimeter scale transfer of NP monolayer at water/air interface onto solid substrates. First, NPs are self-organized at water/air interface. The NP monolayer at the interface is then selectively separated by capillary action within a small tube. The tube is reversed upside-down to expose the monolayer to the other end of the tube. The exposed monolayer is finally transferred to a solid substrate. Raman mapping measurements show uniform optical properties over the entire gold NP monolayer. Various tubes, substrates and NPs are further tested to show the feasibility of our method.