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Assembly of Nanoparticle-Attached AFM Tips for Nano-Optical Applications¹ TAEKYEONG KIM, SUNG MYUNG, NARAE CHO, SEUNGHUN HONG, School of Physics, Seoul National University, Seoul, Korea — The well-defined geometry and chemical properties of the end of atomic force microscopy tips are critical components for various tip-enhanced nano-optical applications such as nanoscale Raman and FRET imaging. However, conventional AFM tip fabrication method often results in a large variation of tip shapes and chemical properties. Recent nanotechnology allows us to synthesize ‘nanoparticles’ (e.g. Au, Ag, CdSe, etc). We developed a method to mass-produce ‘AFM tips with well-defined geometry and chemical properties’ by assembling a single nanoparticle at the end of the tip via self-assembly strategy. In this way, only the end part of the tip is functionalized with organic molecules which attract nanoparticles in the solution. When the functionalized tip is placed in the nanoparticle solution, nanoparticles are selectively assembled only onto the end of the tip. We assembled a nanoparticle (e.g. 50nm diameter Au nanoparticle) at the end of the tip and demonstrated AFM imaging using these tips. Our method allows us to assemble nanoparticles at the end of the tip, and it can be scaled up for large scale assembly.

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