

New Tip Fabrication Techniques for Atomic Force Microscopy

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A hydrophobic polymeric tip of atomic force microscopy has been fabricated by two-photon adsorbed photo polymerization methods (TPAP). The fabrication was performed by a layer-by-layer polymerization of sliced multiple 3-dimensional computer-aided design data. The used base resin was composed of acrylate and epoxy, which showed hydrophobic properties after the photo polymerization. For the sharp tip fabrication, we used "dynamic partial polymerization method" which applied "the threshold effect" of TPAP to maximize the fabrication resolution. To investigate the performance of the fabricated polymeric tip, we have imaged several organic, inorganic and biological samples using contact or dynamic force mode. The imaging results showed the hydrophobic polymeric tips solved various problems related to the tip adhesion to hydrophilic sample surfaces. Finally, the topographic image resolution of sub-5 nm was obtained using the polymeric tips. In the presentation, we will discuss general concept for TPAP techniques and possibilities for the nano scale fabrication as well as the application to atomic force microscopy.