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Patterning the adhesive properties of amine-rich polymer films

STEFAN STOIANOV, Virginia Tech Department of Physics, CHALONGRAT DAENGGAM, MALIHE BORHANI, Virginia Tech Department of Physics, YONG XU, Virginia Tech ECE, HANS ROBINSON, Virginia Tech Department of Physics — Full integration of top-down and bottom-up nanofabrication technologies will require the ability to accurately place nanostructures onto well-defined locations on a surface, where the nanostructures initially only exist suspended in a liquid. As the nanostructures may be quite fragile, perhaps the best way to do this is to pattern the adhesiveness of the surface in order to guide assemblies to the desired locations. We have demonstrated two routes for achieving this using the amine-rich, nm thick polymer films based on poly(allylamine hydrochloride). The adhesive properties of the films can be patterned with standard lithographic techniques, where adhesion to selected portions of the surface is suppressed either by treatment with acetic anhydride or by direct exposure to ultraviolet light. We applied these techniques both to flat and curved substrates and demonstrate spatial resolution better than 100 nm.

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