

Dip-Pen Nanolithography for Templated Assembly with Biomaterials and Organic Films

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Abstract

Dip-Pen Nanolithography (DPN) is a scanning-probe lithography technique that permits the chemical functionalization of surfaces with nanoscale precision. We describe the use of DPN to pattern a variety of soft organic and biological nanostructures that we use to direct the assembly of materials processed from solution. For example, by selectively functionalizing electrodes with nanoscale DNA patterns we are able to capture specific sizes of metal nanoparticles and measure their electrical properties. In another application, by generating high-resolution (sub-100 nm) patterns with different functional self-assembled monolayers on various electrode surfaces, we have the ability to systematically nucleate, as well as guide, the phase separation behavior of polymer films when they are spin-coated onto substrates. We discuss the potential use of these techniques in applications ranging from biological diagnostics to organic electronics.

Author Biography

David S. Ginger earned dual B.S. degrees in chemistry and physics at Indiana University in 1997. He received a British Marshall Scholarship and NSF Graduate Fellowship and completed his Ph.D. in physics in the Optoelectronics Group at the University of Cambridge (UK) in 2001. He then worked with Chad Mirkin as an NIH Postdoctoral Fellow and a DuPont Fellow at Northwestern University. He is presently an Assistant Professor of Chemistry at the University of Washington in Seattle. His research interests center on the physical chemistry of nanoscale materials.