

Fabrication of nanocomposite micropatterns of polymers and colloids using L-LbL (Lithography-Layer-by-Layer) technique

Javeed Shaikh Mohammed¹ and Michael J. McShane^{1,2*}

¹Institute for Micromanufacturing, Louisiana Tech University, Ruston, LA

²Biomedical Engineering Program, Louisiana Tech University, Ruston, LA

A novel fabrication technique to construct micropatterns of different organic and inorganic materials with defined spatial arrangement and micro- and nanoscale features on a single substrate is introduced. A simple yet versatile and precise patterning technique for the fabrication of interdigitated and pattern-on-pattern micropatterns of nanocomposite multicomponent films on a single substrate has been demonstrated, through a combination of lithography and layer-by-layer (LbL) assembly process, termed as L-LbL. The nanocomposite patterns are constructed using lithography followed by LbL multilayer assembly and lift-off. Two- to four-component systems, including interdigitated polymer, nanoparticle patterns; polymer-on-polymer, nanoparticle-on-nanoparticle, polymer-on-nanoparticle patterns have been demonstrated. The versatile and tunable nature of the technique allows a variety of materials and micro- and nanoscale topographies making it highly suitable for a broad array of studies aimed at identifying important biological structure-function relationships, but the applicability of the technique is broader and may also impact electronics, photonics, and chemical microsystems.

Keywords: multicomponent micropatterns, multilayers, LbL (layer-by-layer), self-assembly, nanoparticles.

*Corresponding Author:

Michael J. McShane

Assistant Professor, Biomedical Engineering Program

Louisiana Tech University

Mailing Address:

PO Box 10137

911 Hergot St.

Ruston, LA 71272

Tel. 318-257-5112

Fax 318-257-5104

[*mcs Shane@coes.latech.edu](mailto:mcs Shane@coes.latech.edu)