Abstract:

Patterning is a necessary step in the fabrication of many devices such as integrated circuits, information storage devices, miniaturized sensors, and solar cells. Current techniques for the direct patterning of nano-scale features is limited to time-consuming and often expensive methods such as photolithography, electron beam lithography or ion beam lithography. As these techniques encounter practical limitations that impede their development for industrial or commercial applications, imprint lithography has emerged as an attractive alternative.

Imprint lithography offers methods for fabrication of micro and submicron feature arrays show great benefits, such as low fabrication cost and high throughput. In this approach, polymeric stamps are patterned using a focused ion beam and then used to print the inverse of the pattern on nanoparticle suspension films in order to create uniform feature arrays. During the suspension stamping process, the film must be able to both fill the stamp entirely and separate cleanly while avoiding cracking and feature breakage. High molecular weight PMMA was chosen as a binder for the nanoparticle films due to its flexibility and durability. Current work focuses on optimizing the ZnO-PMMA hybrid suspension in order to minimize both agglomeration and phase separation.

Biosketch:

Ms. Michelle Gervasio is a PhD candidate in the Materials Science and Engineering department under the advisement of Dr. Kathy Lu. She completed her undergraduate degree in Materials Science and Engineering at Virginia Tech in 2012. Michelle is also a guest researcher at the National Institute of Standards and Technology working with the fire prevention research division of the engineering laboratories.