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Nanostructured Materials and Interfaces: Patterning and Templating

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Abstract:
The preparation of new polymers and nanomaterials require hierarchical levels of ordering and structuring: from molecular to macroscopic. The tools and methods available for evincing this order require design principles that start from non-covalent interactions all the way to object patterns that can be manipulated by non-lithographic methods: templating and patterning. The ability to synthesize and fabricate new macromolecules and layered ordered systems result in new material stimuli-responsive properties. We have previously highlighted the research philosophy and research methods used by our group to produce systems that include: 1) polymer brushes, 2) electropolymerized molecularly imprinted sensors, 3) electronanopatterning, 4) colloidal nanosphere lithography, and, 5) multilayer shape-stimuli patterned objects and particles. In this talk, we will specifically highlight work on nanostructured superhydrophobic coatings with stimuli-responsive properties. This is based on grafted polymer brushes with an LCST behavior and the use of templated polymer particle arrays. What is also important is the use of surface sensitive spectroscopic and microscopic analytical tools applied rationally to highlight evidence of order and function.

Short Biography:
Rigoberto Advincula is Professor at the Department of Macromolecular Science and Engineering, Case Western Reserve University in Cleveland, Ohio, USA. He is a Fellow of the American Chemical Society (ACS), Fellow of the Polymer Science and Engineering Division (ACS), Fellow of the Polymer Chemistry Division (ACS). He received the distinguished Herman Mark Scholar Award in 2013. In 2018, he was elected National Academy of Science and Technology (NAST), Philippines. He recently has been appointed to the World Economic Forum, Advanced Materials Council. He is Editor of MRS Communications and Reactive and Functional Polymers. He has held a number of visiting Professor positions including Waseda University in Japan. His group does research in polymer materials, nanocomposites, colloidal science, 3D printing, hybrid materials, and ultrathin films towards applications from smart coatings to biomedical devices. He is passionate in mentoring students and helping other countries in their STEM programs.