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Controlled adhesion of liquid droplets on smart surfaces

The control of adhesion of liquid droplets on solid substrates has broad implications in surface cleaning, water treatment, microfluidics, biochemistry and lab-on-a-chip devices. An earlier report using a conjugated polymer, Polyaniline (PANI) doped with Dodecylbenzene Sulfonic Acid (DBSA), demonstrates the control of the contact angle of a liquid droplet. Poly(3,4-ethylenedioxythiophene) polymers bearing imidazolium ionic-liquid moieties (PEDOT-Im) show multi-responsive properties to a variety of stimuli, such as temperature, pH, oxidative doping and the presence of anions. Recently, there has been a growing number of reports concerning the liquid adhesion and wetting on polypyrrole surfaces. Here it is shown the development and application of smart polymer functional surfaces using dodecylbenzenesulfonate-doped polypyrrole (PPy(DBS)). This presentation demonstrated a novel *in situ* control of droplet pinning on the polymer surface, enabling the control of droplet adhesion from strongly pinned to extremely slippery (and vice versa). The pinning of organic droplets on the surfaces is dramatically controlled *in situ*, presenting a great potential for manipulation and control of liquid droplets for various applications including oil separation, water treatment and anti-bacterial surfaces. It is believed that our work represents a major advance in materials science and engineering, especially pertaining to those topics that involve functional and tunable surfaces.

Biography

Eui-Hyeok Yang is a Professor of Mechanical Engineering Department at Stevens Institute of Technology. He has obtained his PhD from Ajou University, South Korea. After his Postdoctoral Training at University of Tokyo and at California Institute of Technology, he joined NASA's Jet Propulsion Laboratory where he became a Senior Member of the Engineering Staff. At JPL, he had received a number of awards, including NASA ICB Space Act Awards, Bonus (Level B and C) Awards and a number of Class 1 NASA Tech Brief Awards. In recognition of his excellence in advancing the use of MEMS-based actuators for NASA's space applications, he received the prestigious Lew Allen Award for Excellence at JPL in 2003. He is an Associate Editor and/or on the Editorial Board of several journals including Nature's *Scientific Reports*.

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