Gibum Kwon

Assistant Professor
Mechanical Engineering

Gibum Kwon joined the Department of Mechanical Engineering at University of Kansas in August 2016. He received his Ph.D. in Materials Science and Engineering from the University of Michigan – Ann Arbor in 2014, where he developed novel methodologies for effective separation of liquid-liquid mixtures. During his Ph.D., he was awarded a Rackham Predoctoral Fellowship (2013), as well as Materials Research Society (MRS) Graduate Student Silver Award (2013) and multiple poster awards. From 2014 to 2016, he worked as a Postdoctoral Associate at the Massachusetts Institute of Technology. At MIT, he conducted research on the wettability switching of photo-responsive semiconducting materials upon light illumination. Dr. Kwon has co-authored 10 refereed journal articles, as well as 4 patents of which 2 have been licensed and multiple conference papers. His current research interests include liquid-liquid separations, self-healable coatings, and shape memory polymers with special wettability.

Surfaces with tunable wettability: Design and Applications

The wettability of solid surfaces for contacting liquid droplets is of great interest in a wide range of practical applications in daily life, industry and agriculture. In particular, surfaces with tunable wettability are unique because they can switch their wettability for liquids upon external stimuli such as light, electric potential difference, heat and strain. Such surfaces are important for applications including oil-water separation, manipulating droplet motion on a surface, microfluidic devices, self-cleaning and drug delivery.

The wettability of a solid surface is a function of both the surface chemistry and the surface texture (i.e., roughness). For example, a rough surface (e.g., fabric) coated by low surface energy material (e.g., Teflon®) exhibits super-repellency for contacting water. When an electric potential difference is applied across the surface and the water drop, the surface loses its super-repellency and gets wet by water. Therefore designing surfaces with tunable wettability needs a careful consideration of surface chemistry, roughness, as well as an external stimulus.

In this talk, we will discuss the design of surfaces with switchable wettability for contacting liquids (e.g., water or oil) upon application of external stimuli including visible light, voltage and solvent. We will also discuss their practical applications in oil-water separation, produced water treatment, manipulating droplet motion and self-cleaning.

Thursday, Sept 14th, 2017

2 Eaton Hall (Spahr Auditorium) 11:00 – 11:50AM