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JANUS-TYPE POLYMERIC NANOPARTICLES FOR CHEMICAL SENSING

Seung Hyun Kim and **Jung Ki Lee**
Inha University, Republic of South Korea

Janus particles are a special type of colloidal particles with two distinct parts on the same particle, whose surfaces have different materials or different functional groups. Analogous to traditional colloids, they are large enough to be observed under optical microscopy in real time and small enough to diffuse by Brownian motion. However, their distinct surface properties and non-centrosymmetry leads to new novel material properties as well as interesting aggregation behaviour. In this work, Janus particles with self-propulsion ability are utilized for chemoresistor sensor where the adsorption of sensing molecules changes the resistance of the device. PS particles with size of hundreds nanometer coated on one side with a thin platinum layer were self-propelled in the solution of hydrogen peroxide that served as fuel in these experiments. Especially, these Janus particles were driven to be preferentially located between two electrodes, and the resistance variation was monitored to detect the sensing molecules. The autonomous movement of micromotors offers considerable promise for enhancing the detection power of a wide range of chemical sensing processes.

Recent Publications:

1. J Zhang, B A Grzybowski and S Granick (2017) Janus particle synthesis, assembly and application. Langmuir. 33(28):6964-6967.
2. J R Howse, R A L Jones, A J Ryan, T Gough, R Vafabakhsh and R Golestanian (2007) Self-motile colloidal particles: from directed propulsion to random walk. Phys. Rev. Lett. 99:048102.
3. R Golestanian, T B Liverpool and A Ajdari (2005) Propulsion of a Molecular Machine by Asymmetric Distribution of Reaction Products Phys. Rev. Lett. 94:220801.

Biography

Seung Hyun Kim is a Professor in the Department of Applied Organic Materials Engineering in Inha University, Incheon, South Korea. He pursued PhD in the Department of Fiber and Polymer Science and Engineering in Seoul National University, South Korea. He worked as a Postdoc with Prof. Russell at UMASS, MA, USA. He joined as a professor at Inha University, South Korea since 2005. His research interest includes: self-assembly, block copolymers, colloids, nanostructure and nanopatterning.

shk@inha.ac.kr