Research Seminar

NUS National University of Singapore

Department of Chemistry
Faculty of Science

Smart Interfacial Materials with Super-Wettability

by Professor Lei Jiang
Chinese Academy of Sciences, Beijing, China
Beihang University, Beijing, China

Host: Prof Liu Xiaogang | Wed, 15 Jan 2020 14:00 – 15:30 | Executive Classroom S8-03-14

About Professor Lei Jiang

Professor Lei received his B.S. degree in solid state physics (1987), and M.S. degree in physical chemistry (1990) from Jilin University in China. From 1992 to 1994, he studied in the University of Tokyo in Japan as a China-Japan joint course Ph.D. student and received his Ph.D. degree from Jilin University of China with Professor Tiejin Li. Then, he worked as a postdoctoral fellow in Professor Akira Fujishima's group in the University of Tokyo. In 1996, he worked as researcher in Kanagawa Academy of Sciences and Technology, Professor Hashimoto's project. In 1999, he joined Institute of Chemistry, Chinese Academy of Sciences (CAS). In 2015, he moved to the Technical Institute of Physics and Chemistry, CAS. Since 2008, he also served as the dean of School of Chemistry and Environment in Beihang University. He was elected as members of the Chinese Academy of Sciences and The World Academy of Sciences in 2009 and 2012. In 2016, he also elected as a foreign member of the US National Academy of Engineering. He has been recognized for his accomplishments with Qiu Shi Outstanding Scientist Award (Hongkong, China, 2018), Humboldt Research Award (Germany, 2017), Nikkei Asia Prize (Japan, 2016), MRS Mid-Career Researcher Award (USA, 2014), National Natural Science Award (China, 2005), and many other honors and awards. He has published over 500 papers which have been cited more than 105000 times with an H index of 150.

Abstract

Learning from nature and based on lotus leaves and fish scale, we developed super-wettability system: superhydrophobic, superoleophobic, superhydrophilic, superoleophilic surfaces in air and superoleophobic, superareophobic, superoleophilic, superareophilic surfaces under water. Further, we fabricated artificial materials with smart switchable super-wettability. The concept was extended into 1D system. Energy conversion systems that based on artificial ion channels have been fabricated. Also, we discovered the spider silk's and cactus's amazing water collection and transportation capability, and based on these nature systems, artificial water collection fibers and oil/water separation system have been designed successfully. We also extended the superwettability system to interfacial chemistry, including basic chemical reactions, crystallization, and nanofabrication arrays.

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