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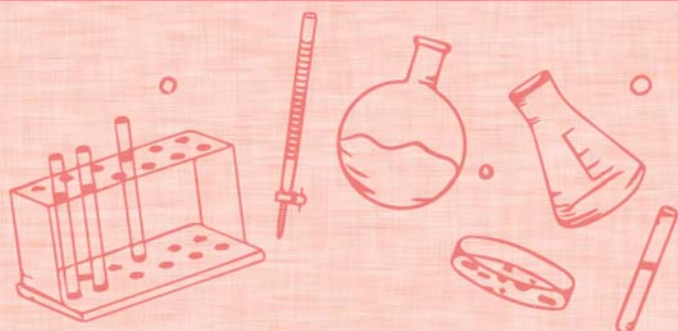


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Compositional Design and Surface Chemistry of Silicon-Based Nanomaterials

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Compositional Design and Surface Chemistry of Silicon-Based Nanomaterials

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Abstract

As one of the most commonly applied semiconductors, nanostructured silicon has received considerable attention over the past several decades due to its natural abundance, suitable band gap for light harvesting, tunable photoluminescence, and high biocompatibility. Significant efforts have been made to optimize the synthetic strategies, the surface modification methods, and the corresponding devices. However, numerous important questions remain in this field of silicon. Our research team has focused on the fundamental understanding of the nanostructural silicon, including the nature of the covalent atomic framework, the surface bonds, and the photophysical properties of silicon nanocrystals. This presentation will cover our recently developed strategies to manipulate the compositions and the optical properties of silicon-based nanomaterials, such as silicon suboxides, quantum dots, and bulky structures. The corresponding prototype applications of these materials, such as multimodal anticounterfeiting, bioimaging, and photocatalytic reactions, will also be discussed.

Zhenyu (Kevin) Yang received his B.Sc. in Chemistry from Nankai University in 2009 and his Ph.D. in Chemistry from the University of Alberta in 2014, under the supervision of Prof. Jonathan Veinot. His Ph.D. research focused on the synthesis and surface chemistry of group 14 materials such as silicon and germanium. He joined Prof. Edward Sargent's laboratory at the University of Toronto as a postdoctoral research fellow in July 2014. In 2018, Kevin was selected as one of the "Thousand Talents Program" junior scholars and joined the School of Chemistry at Sun Yat-sen University as a Professor. His research has been focusing on the development of quantum dot surface chemistry, the preparation of new nanomaterials, and solution-processed optoelectronic devices such as light-emitting devices and photovoltaics. He is the co-inventor of 8 patents and has over 70 peer-reviewed publications, including *Nature Photonics*, *Nature Communications*, *Journal of the American Chemical Society*, *Advanced Materials*, and *Nano Letters*.

