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Biography

Xuming Zhang received BEng degree in Precision Mechanical Engineering from the University of Science & Technology of China (USTC) in 1994, and Ph.D. degree from School of Electrical & Electronic Engineering, Nanyang Technological University (NTU) in 2006. He is currently an associate professor with Department of Applied Physics, Hong Kong Polytechnic University. He has published more than 70 journal papers. His research interests cover mainly optofluidics, artificial photosynthesis, biomimetics and green energy.

Optofluidics for artificial photosynthesis

Artificial photosynthesis (APS) mimics natural photosynthesis (NPS) to store solar energy into chemical compounds for the applications such as water splitting, CO₂ fixation and coenzyme regeneration. In fact, the NPS is naturally an optofluidic system since the cells (typical size 10 to 100 μm) of green plants, algae, and cyanobacteria enable light capture, biochemical and enzymatic reactions and the related material transports in a microscale, aqueous environment. Long history of evolution has equipped the NPS with the remarkable merits such as large surface-area-to-volume ratio, fast diffusion of small molecule and precise control of mass transfer. The APS is expected to enjoy the same merits of NPS and even provides more functionalities if optofluidics technology is introduced. Recently, many studies have been reported on optofluidic APS systems. This talk will review recent progresses in water splitting, CO₂ fixation and coenzyme regeneration, followed by the discussions of pending problems for real applications. There is still a large room for further improvement of the optofluidics-based artificial photosynthesis.

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