

Rough Gold Films as Broadband Plasmonic Absorbers of Sunlight

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Plasmonic photocatalysis has two fundamental problems: narrow LSPR absorption band and low absorbance, which limit the utilization efficiency of sunlight. A blackbody-like absorber would be ideal to make full use of the whole solar spectrum. This talk will present new black absorber structures based on Au nanostructures and TiO₂ films. The absorber is composed of a TiO₂ layer sandwiched between a layer of Au nanoparticles (AuNPs) and a rough Au layer (AuNP/TiO₂-Au film). The random nature of Au nanostructures enables the plasmonic absorption of lights at different wavelengths, which generates hot electrons to feed the TiO₂ film. Experiments show a strong absorption (72% – 91%) over 400 – 900 nm and a much-enhanced photocurrent (by 20 folds) as compared to the bare TiO₂ film, making it ideal for solar applications such as photocatalysis and photosynthesis. This talk will cover the idea, the technical details and the perspectives.

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Short Bio:

Xuming Zhang is currently an associate professor with Department of Applied Physics, Hong Kong Polytechnic University. He 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 has published more than 90 journal papers. His research interests cover mainly optofluidics, artificial photosynthesis, biomimetics and green energy.