Emerging semiconductors for solar harvesting by solution process

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To extend solar energy applications beyond the utilization of solar panels on the rooftops and solar field, a more advanced technology involving new materials, novel processing and fabrication techniques, are required. Fabrication of high quality semiconductor film and nanostructures using solution methods is one promising approach in the discovery of materials with new properties and functionalities. In this talk, I will give an overview of our work in improving the bulk optical and electronic properties of semiconductor photoabsorbers, fabricated using solution methods. In particular, I will share our strategy in producing next generation CZTS-inspired thin film solar cells with efficiency up to 11%. We also found that directional growth of the favorable [hk1] planes of Sb2S3 can be achieved on ultrathin TiO2/CdS electron transport layer and yield an efficiency of 9%. Al-doped CuS is used as hole transporting layer in semi-transparent p-i-n perovskite solar cell which enhances charge transport and device long term stability. I will also share our activities in artificial photosynthesis using nanostructured metal oxide (Fe_2O_3, Fe_2TiO_5, $FeVO_4$, etc) and chalcogenide, particularly in improving the charge transport and separation efficiency by doping, surface passivation and co-catalyst integration.

Biography

Lydia Wong is an Associate Professor at the School of Materials Science and Engineering, Nanyang Technological University (NTU), Singapore. She graduated with Bachelor of Applied Science (First Class Honors) and Doctor of Philosophy, both in Materials Science and Engineering from (NTU). She was a Senior Engineer at Chartered Semiconductor (now called Global Foundries) and a Visiting Scholar at the Department of Chemical Engineering, Stanford University. Her research interest is in the structural and chemical modification of semiconductor materials for clean energy and electronics applications. She has published more than 140 publications in international peer reviewed journals and cited more than 7800 times. She was an Editor at Journal of Materials Science: Materials in Electronics and presently sits at the Editorial Advisory Board of Solar RRL.