

University of Macau

Faculty of Science and Technology

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Solar Energy Conversion, Storage and Applications

By

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Abstract

Energy crisis and environmental pollution by burning fossil fuel force people searching for clean and sustainable energy sources. Solution processed organic solar cells converting the sunlight into electricity can be low cost, flexible, semi-transparent, light-weight and robust devices. Potential applications due to these unique merits of organic solar cells attracted broad attention. Enormous global efforts and close interdisciplinary collaborations result power conversion efficiency above 10% for small ($< \text{cm}^2$) size devices. Electricity generated by solar cells always with huge fluctuation due to the variation of the sunlight in daytime, which limits its application. Therefore, devices storing electricity from solar cells become more important. In addition, integrating transparent solar cells with other functional devices makes dual functional device possible. In our university, we work on solar energy conversion, storage and applications. I will present our effort on printing semi-transparent solar panels, bulk-heterojunction organic solar cells and solar powered polymer electrochromic smart windows for energy saving buildings.

Biography

Fengling Zhang, Professor of Physics at Department of Physics, Chemistry and Biology, Linköping University (Sweden), received her PhD from Changchun Institute of Physics, Chinese Academy of Sciences in 1998 on Organic light-emitting diode. Then she joined Department of Applied Chemistry at Osaka University, Japan as a postdoc. In 2000, she moved to Department of Physics, Chemistry and Biology (IFM), Linköping University as a postdoc and began working on Polymer Solar Cells. Her research covers optimizing new polymers, exploring new device structures and investigating the factors governing the photovoltaic performance of polymer solar cells.

Fengling Zhang is one of pioneers in Indium-tin-oxide (ITO) free polymer solar cells (2002), mixing solvents for modulating morphology of active layers (2006), solution processing interfacial layer (2007), inverted vacuum free and semi-transparent solar cells (2009) and integrated dual functional solar powered smart window (2014).

Since 2001, she published 122 peer-reviewed articles with a total citation of 7914 and h-index of 46, which distinguished her as one of the World's Most Influential Scientific Minds by Thomson Reuters in 2014 and 2015 in Materials Science. Her publications and citations have made a big contribution in augmenting LiU's ranking in ARWU2014 with a 70 spot climb in 1 year (<http://www.liu.se/liu-nytt/arkiv/nyhetsarkiv/1.579883?l=en>).

Currently, she is working on Biodegradable organic solar cells; Solution processed solar-powered organic electrochromic devices; Organic photodetectors for bio-sensing applications; Device physics of non-fullerene organic solar cells; Integrating organic solar cells with super-capacitors.

All are Welcome!