MSE-Colloquium@NTU

16 August 2018, 2:00 pm

Tan Chin Tuan Lecture Theatre, Nanyang Technological University, Singapore

Towards Large-Area, Stable, High Efficiency Perovskite Solar Cells

Professor Park Nam-Gyu

School of Chemical Engineering
Sungkyunkwan University
South Korea

Abstract

Since the first report on solid-state perovskite solar cells (PSCs) with power conversion efficiencies (PCEs) of 9.7% and 500 h-stability by our group in 2012, research on PSCs have increased exponentially. As a result, PCEs approaching 23% have been reported, which is higher than conventional inorganic thin film solar cells, and publications in this area have reached more than 9,000 as of May 2018.

It is believed that PSCs are promising next-generation photovoltaics due to their superb performance and low cost. In this talk, the history of perovskite photovoltaics will be presented along with their scientific progress and perspective. For reproducible and high quality perovskite films, the Lewis acid-base adduct method was developed. The grain-boundary healing method was developed via the non-stoichiometric approach and yields PCEs as high as 20.4%. The method for reducing hysteresis and improving moisture stability was developed by interfacial engineering using 2-dimensional perovskite.

A universal method to eliminate hysteresis in normal mesoscopic structures was discovered. A large-area coating technology was developed to commercialize high efficiency PSCs via perovskite single crystals (or powder) based viscous liquid. A unique bifacial stamping technique was developed to produce high PCE (>20%) $MAPbI_3$, $FAPbI_3$ and other compositions at mild conditions. Halide perovskites are now extended to X-ray imaging, LED and resistive memory areas, which will be discussed in this talk.

MSE-Colloquium@NTU

16 August 2018, 2:00 pm
Tan Chin Tuan Lecture Theatre, Nanyang Technological University, Singapore

Biography

Dr Park Nam-Gyu is a Professor and SKKU-Fellow at the School of Chemical Engineering, Sungkyunkwan University. He received his B.S. (1988), M.S. (1992) and PhD (1995) from Seoul National University. He worked as a postdoctoral researcher at ICMCB-CNRS, France from 1996 to 1997, and at the National Renewable Energy Laboratory, USA from 1997 to 1999. Thereafter, he worked as a Principal Scientist at the Electronics and Telecommunications Research Institute (ETRI) from 2000 to 2005, and became the Director of the Solar Cell Research Centre at the Korea Institute of Science and Technology (KIST) from 2005 to 2009, before joining Sungkyunkwan University as a full Professor in 2009.

He has been researching on high efficiency mesoscopic nanostructured solar cells since 1997. He is a pioneer of solid-state perovskite solar cells which was first developed in 2012, and is a fellow of the Korean Academy of Science and Technology (KAST). In addition, he was selected as a New Class of Nobel Prize Worthy Scientists by Clarivate Analytics and has received awards, including the Scientist Award of the Month (MEST, Korea), KyungHyang Electricity and Energy Award (KEPCO, Korea), KIST Award of the Year (KIST, Korea), Dupont Science and Technology Award (Dupont, Korea), SKKU Fellowship, MRS Outstanding Research Award (MRS, Boston), WCPEC Paper Award (Kyoto, Japan), Hamakawa Award of PVSEC (Busan, Korea) and the KAST Engineering Award (KAST, Korea).

He has published over 230 peer-reviewed scientific papers in Nature, Science, Nature Materials, Nature Nanotechnology, Nature Energy and Nature Communications. He has 80 patent applications and has edited 1 book and 7 book chapters. His H-index is 70 (Google Scholar) as of September 2017.

NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

SCHOOL OF MATERIALS SCIENCE AND ENGINEERING