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JOINT MICRO-NANO / LMP SEMINAR

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Carbon Nanotubes and Graphene for Perovskite Solar Cells

Abstract

Single-walled carbon nanotubes (SWNT), graphene, and fullerene (C_{60} and PCBM) would be very efficiently used in lead halide Perovskite solar cells. A film of SWNTs or graphene can be flexible and stretchable transparent-conductive layer. At the same time, this film can be carrier-selective layers, i.e., electron-blocking-layers or hole-blocking-layers. Based on our experiences of using nanotube films for CNT-Si solar cells [1] and organic polymer solar cells [2,3], we have explored the application of SWNT films for organic-inorganic perovskite solar cells. We have demonstrated the replacement of ITO in inverted-type perovskite solar cells,SWNTs/PEDOT:PSS/$CH_3NH_3PbI_3$/PCBM/Al [4]. The flexible application on polyethylene terephthalate (PET) is also demonstrated [4]. With the improved perovskite structure, a film of carbon nanotubes or graphene can be practical replacement of ITO for the flexible transparent electrode of inverted perovskite solar cells [5].

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Biography

Professor Shigeo Maruyama received his Ph.D. from the School of Engineering at the University of Tokyo in 1988. Since 2014, he is a Distinguished Professor at the University of Tokyo. From April 2015, he works as a cross-appointment fellow for Advanced Industrial science and technology (AIST) in Japan. From 2016, he is also serving as guest professor at Peking University. Prof. Maruyama has served as a program officer of Japan Society for the Promotion of Science (JSPS) during 2009-2012, and as the president of "*The Fullerenes, Nanotubes and Graphene Research Society*," since 2011, and the co-chair of steering committee of Carbon Nanotube conferences. He also served as Director of *The Japan Society of Applied Physics* since 2014 and as Executive Director in 2015. He has published more than 210 ISI-listed papers which have been cited more than 9,000 times, resulting the h-index of 50 (Google Scholar shows 15, 832 citations and h-index 64).

Host: Professor Anastasios John Hart: ajhart@mit.edu
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