

709th ASRC Seminar

Date: 16:00 ~ 17:00 Tue., January 23

Location: Room 211, J-PARC

Laboratory Bldg.

Speaker: Professor Seung-Hun Lee

(Department of Physics, University of Virginia)

Title: Origin of Long Lifetime of Band-Edge Charge Carriers in Solar Cell Perovskites

Abstract: Long carrier lifetime is what makes hybrid organic-inorganic perovskites high performance photovoltaic materials. Lee group and his colleagues showed [1-3] that the screening of band-edge charge carriers by rotation of organic cation molecules is a major contribution to the prolonged carrier lifetime. Their results reveal that the band-edge carrier lifetime increases when the system enters from a phase with lower rotational entropy to another phase with higher entropy. These results imply that the recombination of the photo-excited electrons and holes is suppressed by the screening, thereby extending the lifetime. Thus, searching for organic-inorganic perovskites with high rotational entropy over a wide range of temperature may be a key to achieve superior solar cell performance.

[1] Tianran Chen et al., Proceedings of National Academy of Sciences 114, 7519-7524, (2017).

[2] Tianran Chen et al., Science Advances 2, e1601650 (2016).

[3] T. Chen et al., Phys. Chem. Chem. Phys. 17, 31278-31286 (2015).

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