MAR17-2016-020143

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Confinement Effects in Corner-, Edge- and Face-sharing Iodine-based Hybrids

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We investigate organic-inorganic hybrids that combine electronic functionality of the perovskite structures and structural flexibility of metal-organic framework compounds. The chemistry of inorganic materials offers a wide range of band gaps or bandwidths with high carrier density and mobility, magnetic interactions, ferroelectric transitions and thermal stability. On the other hand, organic solids provide nearly unlimited flexibility in structural diversity, good polarizability and they can also be made conductive. The aim of investigating these hybrid materials is to utilize the chemical diversity of the organic moieties with the physical properties of the inorganic moieties to produce useful combinations or even completely new phenomena. We illustrate the opportunities by showing that the structure and properties of the inorganic block can be controlled by using different organic moieties, without the need for substitutions or dopants. References: "Confinement Effects in Low-Dimensional Lead Iodide Perovskite Hybrids" by Kamminga, ME, Fang, HH, Filip, MR, Giustino, F, Baas, J, Blake, GR, Loi, MA, Palstra, TTM, Chem.Mater. vol.28, p4554, 2016.