

Structural diversity and retro-crystal engineering analysis of iodometalate hybrids

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With guidance from retro-crystal engineering, iodometalate structures based on MI₆ octahedra of group 14 (M = Sn(II), Pb(II)) and group 15 (M = Sb(III) and Bi(III)) are analysed. The criterion of I/M ratio, with the function of indicating the degree of condensation of octahedra in inorganic networks and the average charge density at the organic-inorganic interface, is introduced to classify all of the iodometalate networks, resulting in an easy and clear way to identify isomers with different dimensionalities. Of all iodometalates, the 2D M(II)I₄ anion derived from the perovskite network is special since it can be easily stabilized by a range of common organic cations. We provide here the up-to-date progress in this extensively studied field, focusing on crystal engineering of hybrids in the aim of getting materials with a reduced band gap. Relationships between the molecular layouts of cationic entities and the structures of several non-perovskite anionic networks, focusing on the organic-inorganic interface, are highlighted. Distinct dependences between different types of cations and different types of anions are revealed, although it is still unfeasible to apply them in the actual control, design, or prediction of specific hybrid structures.

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