

Halide Perovskite Photovoltaics

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Perovskite solar cells represent a new frontier of 3rd generation photovoltaics. This technology is based on perovskite crystals that have an ABX₃ crystalline structure where A is an inorganic or organic cation, B a metal typically Lead or Tin while X a halogen such as iodine or bromine. Thanks to its defect tolerance, high absorption of sunlight, good conduction properties and the ability to be printed directly on a rigid or flexible substrate, perovskite is an excellent material for solar cells and photovoltaic panels with high efficiency and low cost of production. In fifteen years since their discovery, perovskite cells have achieved efficiencies of over 25% and, as far as stability is concerned, they are starting to be comparable to those of conventional photovoltaics. In this talk, I will briefly summarize the fundamental concepts behind perovskite photovoltaics and present the advances made in this area at the cell, module and panel levels, also discussing the use of two-dimensional materials such as graphene to improve performance and stability of the cell. Finally, I will present the integration between silicon and perovskite for the fabrication of silicon / perovskite tandem cells which is assuming strategic importance on the national and international scene.