Metal halide perovskites in photocatalytic technologies

Vincenza Armenise[1,*], Silvia Colella[2], Francesco Fracassi[1,2], Andrea Listorti[1]

[1]*Department of Chemistry, University of Bari Aldo Moro, via Orabona 4, 70126, Bari, Italy*

[2]*Institute of Nanotechnology, National Research Council of Italy (CNR-NANOTEC), c/o Department of Chemistry, University of Bari Aldo Moro, via Orabona 4, 70126 Bari, Italy*

* vincenza.armenise@uniba.it

In the last decade, metal halide perovskites (MHPs) have revolutionized the field of photovoltaic technologies [1]. This impressive impact is direct consequence of the unique properties of these materials, such as a high optical absorption in the visible region, an easy tunable band-gap, a large ambipolar carrier diffusion and a straightforward deposition processing [2].

These fascinating properties also suggest an alternative utilization that has recently captured the interest of scientists, namely the solar-driven photocatalysis (Figure 1) [3,4]. MHPs can be, indeed, used to perform different photocatalytic reactions under visible-light irradiation including CO_2 reduction, photodegradation of dyes or contaminants and the evolution of one of the most promising energy vectors, i.e., hydrogen (H_2) foreseeing an eco-sustainable future society [3-6]. However, these processes to be effectively green should ideally occur in water or aqueous solutions and this represents a conundrum for the MHPs utilization. It is, in fact, well known that many of halide perovskites are highly unstable upon moisture and water exposure, being hardly compatible with protic media [3,4]. Different strategies have been thus developed to overcome this issue [3] and among them the use of non-equilibrium plasma processes on the MHPs surface could represent a very innovative frontier in the scientific research. In addition, the use of MHPs in aqueous media can give serious concerns about the presence of lead in the most performing ones because it is a toxic metal. Therefore, to focus on the study and application of lead-free MHPs could be very useful [6].

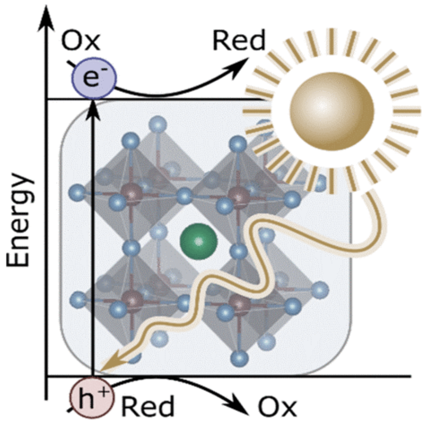

Figure 1. MHPs for solar-driven photocatalysis

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