# Advanced Hybrid Semiconductors for Energy Applications

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Recently layered perovskite materials of the $(R\text{-}NH_3)_2MX_4$ (M = Ge, Sn , Pb, X = Cl, Br, I) family have resurfaced due to their unique optical and electrical properties, (photoluminescence, electroluminescence, third order optical nonlinearity etc.) which make them promising candidates as light harvesters and/or hole conductors for all solid state solar cells[1-4]. The in depth investigation that has been made as far as the organic-inorganic perovskites are concerned shed light on the effects of the organic counterions on the structural and electronic properties of these compounds. It has been shown that the stability against the distortion of the perovskitic cage strongly depends on the embedded cation. Also, the electronic properties and especially the band gap can be tuned by a suitable choice of the organic molecule [5]. Taking into account these facts, we have developed novel hybrid perovskites with tunable band gap that could lead to the preparation of new solid state solar cells with improved efficiency. Important details will be presented and discussed.

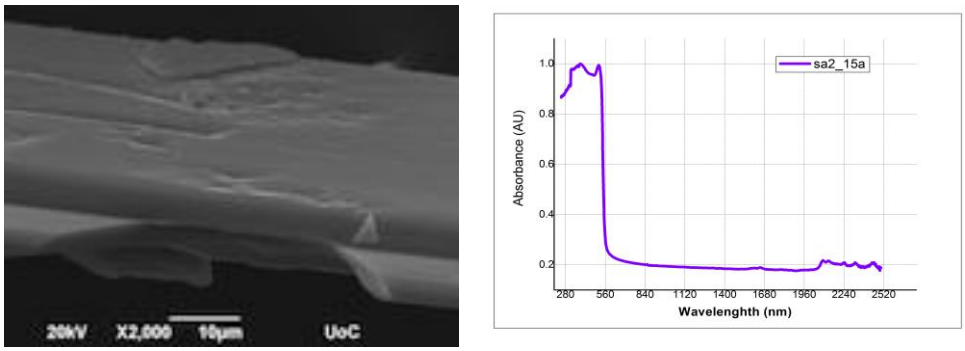


**Figure 1.** (a) Representative SEM image of the organic inorganic $(C_6H_5CH_3NH_3)PbI_3$ perovskite and (b) the corresponding UV-Vis spectrum.

## References

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