

# SPECTROSCOPIC ELLIPSOMETRY STUDY OF HYBRID PEROVSKITE SOLID SOLUTION $FA_xMA_{1-x}PbI_3$ SINGLE CRYSTALS

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Organic-inorganic hybrid perovskites have the generic formula  $ABX_3$ , where X denotes a halide anion and A and B stand for an organic and a metal cation, respectively. These hybrid compounds are semiconductors with highly interesting and tunable properties and are subject of intense research for several applications, mainly in solar cells but also as LEDs and lasers. For all these applications, knowledge of the optical properties is both of fundamental and practical interest. For example, detailed knowledge of the optical constants enables the design and optimisation of light harvesting and out-coupling in the mentioned devices. Tunability of the optical properties may be accomplished by site-substituted solid solutions in A, B, or X sites. In particular, some mixed-cation systems show increased stability for these applications.

In this work, we report on the variation of the optical constants in mixed A-site cation methylammonium (MA) / formamidinium (FA) lead iodide hybrid  $FA_xMA_{1-x}PbI_3$  as measured and analysed by spectroscopic ellipsometry in single crystal samples. The detailed structural phase behaviour of the samples is well established [1]. The main result in this work is the analysis of the observed electronic transitions as a function of the composition obtained from fitting the numerically built second derivatives of the dielectric function. The results are discussed together with other optical measurements (e.g., photoluminescence) by relative comparison to the electronic structures of the parent compounds [2,3].

*Keywords:* Ellipsometry; Hybrid Lead Halide Perovskite; Formamidinium-Methylammonium solid solution; Electronic Structure; Photovoltaics and LEDs

## References

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