Limiting processes in perovskite optoelectronics: new structures for new challenges

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The use of metal halide perovskites for optoelectronic applications has experienced an unprecedented expansion in the last nine years. These materials can form polycrystalline thin films with outstanding semiconducting properties from low-cost fabrication methods, yet their current development has not impacted the commercial applications yet.

Our research lines focus on identifying the physical processes limiting current perovskite-based devices and developing advanced manufacturing methods to fabricate device-oriented metal halide monocrystals (Figure 1) in the macro and nanoscale. We will present optical and electrical characterization techniques which can unveil current perovskite solar cells' working mechanisms [1], while exploring the potential of nano and macro crystals in new applications -catalysis, sensing, X-ray imaging and neuromorphic circuits which will leverage the monocrystalline halide perovskites advantages.

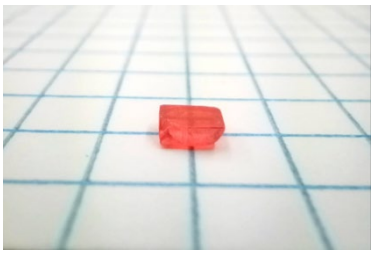


Fig. 1: Centimeter-scale $CH_3NH_3PbBr_3$ monocrystal.

[1] S. M. Yoo, S. J. Yoon, J. A. Anta, H. J. Lee, P. P. Boix, I. Mora-Seró, Joule 2019, 3, 2535.