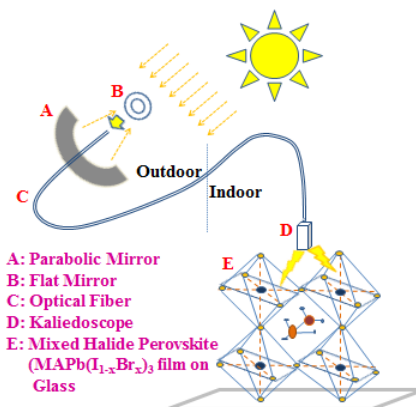


# Concentrated Sunlight for Accelerated Stability Testing of Organic and Perovskite Solar Cell Materials and Devices

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The greatest challenge facing the development of low-cost, solution processed photovoltaic (PV) devices, namely organic- and perovskite- based solar cells with nano-scale morphology and charge transfer dynamics, is combining high efficiency, processability and stability. Concentrated natural sunlight was suggested for accelerated studies of lifetime and light-induced degradation. We recently demonstrated an experimental methodology with independent control of sunlight intensity, the sample temperature and environment during the exposure. P3HT:PCBM films revealed stability for the equivalent of 1.5 years, a result obtained within merely 2 measurement days.<sup>1,2</sup> PTB7:PCBM blends showed solvent-dependent structure and degradation.<sup>3</sup> Studies of perovskite PV materials showed a strong dependence of the stability on the materials composition, correlated with chemical bond strength, crystalline structures and defect density.<sup>4,5,6</sup> Furthermore, the synthesis sequence of the Perovskite deposition process was found to affect its stability, due to the effect of  $\text{PbI}_2$  residue in the film.<sup>7</sup> Accelerated testing using concentrated sunlight is therefore a powerful tool for material and device screening and advanced PV development.



<sup>1</sup> I. Visoly-Fisher, et al., **Sol. Ener. Mater. & Sol. Cells** **134** (2015), 99–107.

<sup>2</sup> E.A. Katz, I. Visoly-Fisher, et al., **Sol. Ener. Mater. & Sol. Cells** **144** (2016), 273–280.

<sup>3</sup> L. Ciammaruchi, I. Visoly-Fisher, et al., **Solar Energy** **137** (2016), 490–499.

<sup>4</sup> R. K. Misra, I. Visoly-Fisher, et al., **J. Phys. Chem. Lett.** **6** (2015), 326–330.

<sup>5</sup> R. K. Misra, I. Visoly-Fisher, et al., **ChemSusChem** **9** (2016), 2572 – 2577.

<sup>6</sup> R. K. Misra, L. Ciammaruchi, S. Aharon, D. Mogilyanski, L. Etgar, I. Visoly-Fisher, E. A. Katz, **ChemSusChem** **9** (2016), 2572 – 2577.

<sup>7</sup> In prep.