

S-METHYLTHIOURONIUM IODIDE IMPROVES PHOTOSTABILITY OF METHYLAMMONIUM LEAD IODIDE PEROVSKITES

Gabrielė Kavaliauskaitė¹, Gintarė Kuksėnaitė¹, Rokas Gegevičius¹, Vidas Pakštas¹, Viktorija Strazdienė¹, Edvinas Orentas², Marius Franckevičius¹, Vidmantas Gulbinas¹

¹ Center for Physical Sciences and Technology, Saulėtekio Av. 3, LT-10257 Vilnius, Lithuania

² Department of Organic Chemistry, Vilnius University, Faculty of Chemistry and Geosciences, Naugarduko 24, Vilnius, LT-03225, Lithuania
gabriele.kavaliauskaite@ftmc.lt

Over the last decade, hybrid perovskites consisting of metal-halide anions and organic cations have made a breakthrough in the development of a low-cost electronic devices such as high-efficiency solar cells [1]. Although the power conversion efficiency of perovskite solar cells already surpassed 25% [2], the structural stability currently is a key challenge for their commercialization. Herein we demonstrate an application of S-methylthiouronium iodide cations $\text{CH}_3\text{SC}(\text{NH}_2)_2^+$ (SMTU) as a possible alternative for partial replacement of methylammonium cations (MA) in lead-halide perovskites towards the fabrication of more stable solar cells of the mixed $(\text{MA})_x(\text{SMTU})_{1-x}\text{PbI}_3$ composition. We characterized the influence of S-methylthiouronium iodide on the perovskite film quality using X-ray diffraction, absorption, fluorescence and time-correlated single-photon counting (TCSPC) spectroscopy. Comparing with a reference methylammonium iodide perovskites, S-methylthiouronium iodide perovskites show increased material stability against photooxidation in ambient air and improvement in the material quality.

[1] J. Burschka, N. Pellet, S.-J. Moon, R. Humphry-Baker et al., Sequential deposition as a route to high-performance perovskite-sensitized solar cells, *Nature* **499**, 316-319 (2013).

[2] NREL Best Research-Cell Efficiencies, <https://www.nrel.gov/pv/assets/pdfs/best-research-cell-efficiencies.20190802.pdf> (accessed: September 2019).