MXenes as Transport Layer Materials for Halide perovskite Solar Cells

Prof. Monica Lira-Cantu
Ashitha Paingott, Kenedy Tabah, Sonia Raga, Masoud Karimipour
Catalan Institute of Nanoscience and Nanotechnology (ICN2)
Campus UAB, Edifici ICN2, Bellaterra (Barcelona); Spain E-08193
monica.lira@icn2.cat

Halide perovskite solar cells (PSCs) have already demonstrated power conversion efficiencies above 25%, which makes them one of the most attractive photovoltaic technologies. However, several challenges must be defeated for the technology to be competitive and commercially available. One of these is their long-term stability and several are the strategies currently employed to stabilize PSCs, for example, the use of complex metal oxides as transport layers, the passivation of defects in the halide perovskite layer through additive engineering, or the replacement of metal electrodes by carbon-based electrodes. In our laboratory, we have explored the use of 2D materials, such as MXenes, as transport layers in halide perovskite soar cells. In this work we present our most novel results on the application of MXenes, Ti3C2Tx, as transport layers and the effect of the intercalation of organic additives. We prepared complete halide perovskite solar cells and analysed device lifetime. Special emphasis is given to their effect on the stability of PSCs under environmental conditions such as humidity, atmosphere, light irradiation (UV, visible) or heat, considering the recently reported ISOS protocols, especially outdoor testing.