



## 2<sup>nd</sup> generation SAM hole-transporting materials

A team of chemists from Kaunas University of Technology (KTU) in Lithuania, working under the PerTPV project, have succeeded in developing second generation hole transporting materials capable of forming a self-assembled hole-transporting monolayer (SA-HTM) on transparent electrode.

The formation of SA-HTM on the transparent electrode circumvents the disadvantages of spin-coating while offering the benefits of uniformly formed layers with minimized thickness, very low material consumption (1g of the material synthesised at KTU is enough to cover up to 1000 m<sup>2</sup> of the surface) and help avoiding doping procedures.

In addition, the self-assembling organic materials synthesised at KTU is significantly cheaper than the alternatives currently used in perovskite photovoltaic devices. p-i-n devices with the second generation SA-HTMs demonstrating very promising power conversion efficiency close to 21% and average fill factor of over 80%. Due to the excellent bonding to the substrate surface, these layers are relatively tolerant against perovskite processing and can ensure a conformal coverage of textured surfaces.

Application of the developed materials in tandem perovskite/silicon solar cells resulted in record 29.15 % efficiency devices. License to produce the material synthesised at KTU laboratories was purchased by a Japanese company Tokyo Chemical Industry Co., LTD and the materials called 2PACz and MeO-2PACz have already appeared on the market. This means that innovative technology using self-assembling compounds can be further researched in the best laboratories of the world and eventually find its way into industry.

