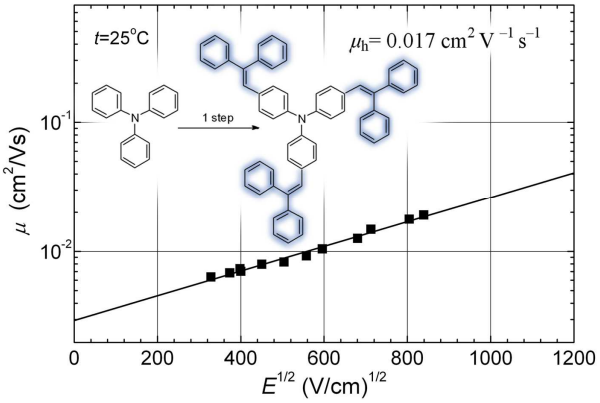
MOLECULAR ENGINEERING OF SMALL MOLECULE HOLE TRANSPORTING MATERIALS FOR PHOTOVOLTAIC APPLICATION

Vytautas Getautis
Radvilenu pl. 19, 50254 Kaunas
Department of Organic Chemistry, Kaunas University of Technology
Lithuania
vytautas.getautis@ktu.lt

Organic-inorganic hybrid lead halide perovskite solar cells have emerged as an extremely promising photovoltaic technology and are gathering more and more attention due to their remarkable photovoltaic performance and potentially low production cost. To date, progress has been made on each layer, with major emphasis on perovskite film processing and relevant material design. Consequently, the power conversion efficiency of lead halide perovskite based thin film photovoltaic devices has skyrocketed from 3.8% to 22% in just a few years.

Despite significant efforts dedicated towards development of new hole transporting materials, the field is still dominated by costly 2,2`,7,7`-tetrakis(*N*,*N*-di-*p*-methoxyphenylamine)-9,9`-spirobifluorene (Spiro-OMeTAD). High cost of Spiro-OMeTAD arises from the prohibitively expensive synthesis and purification procedures used.



This lecture will cover results of our recent investigations in the field of molecular engineering of small molecule hole transporting materials for perovskite solar cells. Our group has been successful in creating several classes of novel organic charge transporting materials, which are on a par with or even better than Spiro-OMeTAD. The molecularly engineered new hole transporting materials were synthesized in one or two steps from commercially available and relatively inexpensive starting reagents, resulting in up to several fold cost reduction of the final product compared with the one for Spiro-OMeTAD. High solubility in organic solvents and facile preparation makes these molecules very appealing for commercial prospects of photovoltaic devices.