VATAVU, S., von MORZE, N., WIESNER, S. et al. $CuInSe_2$ nanostructures prepared by chemical close-spaced vapor transport for hybrid photovoltaic devices. In: **Thin Solid Films, 2017. Vol.633, 2017, pp. 185-192. ISSN 0040-6090.**

This work focuses on the fabrication of stoichiometric $CuInSe_2$ nanostructures with controllable physical parameters of the nanocrystals suitable for hybrid organic/inorganic photovoltaics. $CuInSe_2$ nanostructures were prepared by the chemical close-spaced vapor transport (CCSVT) method onto Mo/barrier/glass substrates by using an In_2Se_3 source material and Cu precursors. The In_2Se_3 source material was volatilized in H_2 ambience with the addition of HCl vapors at 550 °C. Three different types of Cu precursors were used: (i) Cu thin films (6–250 nm thick) deposited by e-beam, (ii) Cu nanoparticles prepared by spray pyrolysis and (iii) Cu nanostructures formed by applying the nanosphere lithography (using a monolayer of 450 nm nanospheres). The CCSVT process parameters were varied to reveal the optimum conditions for the preparation of secondary phases free $CuInSe_2$ nanostructures.

The structural characterization by x-ray diffraction in both grazing incidence and Θ-2Θ configurations revealed the formation of $CuInSe_2$ chalcopyrite phase independently on the applied precursor type. The elemental composition of the as-prepared $CuInSe_2$ nanostructures was analyzed by laser ablation-inductively coupled plasma mass-spectrometry. In non-optimised processes, an excess of Se compared to stoichiometric composition was detected and attributed to the formation of molybdenum selenide and indium selenide phases. The formation of the latter secondary phases was suppressed by tuning the CCSVT deposition parameters.