



Nanocrystal Inks for Solar Paint

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Research in thin film photovoltaics (PV) or the so-called second generation PV has been for the best part of 30 years focused on increasing the efficiency of devices based on CdTe and CuInGaSe₂ in order to rival silicon technologies. However, once the efficiency plateaued the idea of Earth abundant solar absorber emerged and new materials were being explored in order to overcome possible shortages of In, Ga and Te. One such alternative is Cu₂SnSn(S,Se)₄ or CZTSSe. Expectations for this material were high as efficiency quickly rose in the double digits in the laboratory using chemical fabrication methods rather than vacuum based techniques. However little progress has been made on this metric over the last five years despite many methods now producing >10% efficient solar cells. Crystal structure, materials defects, band alignment of interfaces, poor choice of materials all contribute to lower than predicted results. Compromise on efficiency can be tolerated only if significant cost reduction can be offered on the production line. During this talk I will take a closer look at the case of CZTSSe solar cells produced from nanoparticle inks and present our current strategies to understand the physics and chemistry of this material. Could we make solar paint in the near future?