Transition metal doped food waste derived carbon based counter electrode as a cost-effective alternative to Pt-counter electrodes in dye sensitized solar cells

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Counter electrode is an important component of dye sensitized solar cells. Its function is to regenerate the redox electrolyte and thus complete the circuit. Traditional counter electrodes are made of platinum – a rare and very expensive metal. The use of platinum may affect the cost of the solar cell. Therefore, it is vital to search for cost-effective alternatives to platinum. Hereby we present the application of transition metal doped carbon as platinum free counter electrode in dye sensitized solar cells. Proposed material is prepared from natural organic sources following hydrothermal synthetic methods. The counter electrode is made by doctor blading the paste of doped carbon material on FTO glass. The photovoltaic performance of presented material is compared with that of reference cell made of platinum.

Studies of electrical and crystal properties of ALD grown ZnO

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Aluminium doped ZnO (AZO) is an interesting low cost transparent conducting oxide with further use as inorganic transport layer in multilayer solar cells as well as sensors. Here we present our work on atomic layer deposited (ALD) thin films where with optimized growth conditions we can maintain resistivity below 10^{-3} Ωcm even in 50-65 nm thin films grown at low temperatures (530 K) We discuss the influence of crystallographic texture for ALD grown films by comparing plain glass, Al_2O_3 c-plane, and Al_2O_3 a-plane substrates. We show that the doping mechanism in ALD grown AZO is more complex than for e.g. sputtered material as substantial hydrogen interstitial related background doping occurs. We compare results from as grown samples with those briefly annealed at 600 K in nitrogen. This process leads to an increased Hall mobility due to improved grain boundary passivation, but reduced carrier concentration due to partial loss of hydrogen interstitials.