Doped ZnO powders for application in hybrid solar cells

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Modified optical and electrical properties by the addition of small quantities of dopant on zinc oxide nano-particles are presented. The ternary oxides were prepared by mechanical milling which has been proved to be an effective and simple technique to produce nanocrystalline powders. Commercially obtained ZnO powders were mixed with different starting materials: metal oxides (In_2O_3, Al_2O_3) or pure metals (In, Al). The Al^{+3} or In^{+3} act as donor impurities in the ZnO lattice leading to different optical and electrical behaviours in relation with its application in photovoltaic devices. According to initial conditions (precursor, concentrations, atmosphere, etc.) and milling times, different intermediate and final phases with distinct properties were obtained. We have performed structural and optical characterization of the resulting doped-ZnO powders by means of X-Ray Diffraction, Positron Annihilation Lifetime Spectroscopy, Scanning Electron Microscopy and Optical Reflection Spectroscopy. Different assembling methods to use both doped and un-doped ZnO nanocrystalline powders as inorganic constituent in hybrid solar cells are investigated.