

Cu_{2-x}S as possible absorbers and/or p-type semiconductors in photovoltaic cells

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Abstract Copper sulfides (Cu_{2-x}S, x = 0-1) obtained as powders or as thin films, are considered attractive materials for solar energy conversion systems, as semiconductors and/or absorbers of visible light, due to the properties that can be modified with the composition (x value). Copper sulfides present different compositions and crystal structures, ranging from the “copper-poor” phase CuS₂ (copper disulphide) to the “copper-rich” phase Cu₂S (chalcocite). Among these, only Cu_{1.8}S (digenite), Cu_{1.96}S (djurleite), and Cu₂S exhibit photovoltaic activity, the optimum photovoltaic efficiency was obtained when chalcocite (Cu₂S) was used in photovoltaic cell. Therefore systems containing Cu_{2-x}S as absorber and/or p-type semiconductor and a n-type semiconductor (CdS, ZnS, SnS, TiO₂) are recognized as alternatives to silicon wafer cells because of their stability, low cost and satisfactory conversion efficiency. This paper presents fundamental aspects regarding the Cu_{2-x}S chemistry and Cu_{2-x}S-based photovoltaic cells

Keywords: photovoltaic cells, copper sulfides, crystalline structure, optical and electrical properties.
