

## Cu<sub>2-x</sub>S as possible absorbers and/or p-type semiconductors in photovoltaic cells

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**Abstract** Copper sulfides (Cu<sub>2-x</sub>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 CuS<sub>2</sub> (copper disulphide) to the “copper-rich” phase Cu<sub>2</sub>S (chalcocite). Among these, only Cu<sub>1.8</sub>S (digenite), Cu<sub>1.96</sub>S (djurleite), and Cu<sub>2</sub>S exhibit photovoltaic activity, the optimum photovoltaic efficiency was obtained when chalcocite (Cu<sub>2</sub>S) was used in photovoltaic cell. Therefore systems containing Cu<sub>2-x</sub>S as absorber and/or p-type semiconductor and a n-type semiconductor (CdS, ZnS, SnS, TiO<sub>2</sub>) 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<sub>2-x</sub>S chemistry and Cu<sub>2-x</sub>S-based photovoltaic cells

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

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