Contribution à l'étude des composés FeSe2

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Abstract : Iron diselenide (FeSe2) is an interesting p-type semiconductor with a band gap of 1 eV suitable for solar cell applications. Iron diselenide (FeSe2) composite thin films have been deposited at vaccum on glass substrates by thermal evaporation technique from powder. This later was prepared by mechanical alloying of iron (Fe: 99.98 % purity) and selenium (Se : 99.99 purity) as a function of time milling. The depositon of FeSe2 thin films on glass substrat with dimension 20 mm x10 mm. The structural evolution of a binary alloy with nominal composition FeSe2 prepared by ball milling was investigated as a function of milling time. The structural properties of the powders and the films were ascertained by x-ray diffraction method. The XRD patterns showed that for milling times up to 3 h, the FeSe2 phase is formed and appearance of Fe and FeSe. On the other hand the analysis of the films shown clearly the existance of FeSe2 with a preferential orientation according to the plan (110). The band gap Eg, estimated from optical absorption data, was between (0.8 – 1.01) eV, depending on preparation conditions such as substrate temperature. High optical absorption coefficients (> 104 cm? 1in the visible) were found. Electrical resistivity measurements show that conductivity could be analyzed in term of thermoionic emission (Seto's model) at high temperature.

Keywords : FeSe2, Cellules solaires, Evaporation thèrmique, Mécanosynthèse, couche mince