

# *Structural, Electrical and Optical Properties of Fe-doped CuO Deposited by Spray Pyrolysis Technique*

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## ABSTRACT

Our work consists in depositing the copper oxide Fe doped CuO films by spray obtained from the solution of copper chloride CuCl<sub>2</sub> and FeCl<sub>2</sub> with a percentage of 2, 4; 6 and 8%, on glass substrates at a temperature of 3500c. The thin films obtained are characterized by X-ray diffraction, visible UV spectroscopy and the four-point technique. With X-ray diffraction, high peak intensity is obtained for the preferential orientations of (002) and (111), this intensity increases as the doping rate increases and gives us a more crystalline structure for a doping rate of 8%, also a grain size were estimated. The transmission of our films varies between 55% and 75% with a high absorption in the visible domain, the resistivity of our films increase with the increase of doping rate and the gap energy varies between 4.00 and 1.47 eV.

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## I. Introduction

Copper oxide CuO is a semiconductor material that is part of the transparent and conductive oxides (TCO), it has interesting electronic, electrical and optical properties for optoelectronic applications especially in the photovoltaic field. The band energy gap is of direct nature, the value of its optical gap is around 2.1 eV [1]. Copper oxides are used in several areas such as: gas sensors [2-6], solar cells [7-9] and light-emitting diodes [10]. The CuO films can be developed by several techniques such as: cathodic spray, laser ablation [11] and vacuum evaporation [12], chemical vapour deposition [12], sol-gel [13] and pyrolysis spray method [14, 15]. Our job is to obtain thin films of Fe doped CuO by spray spray. Our glass substrates are heated to a temperature of 3500C, the solution used in our work is copper chloride CuCl<sub>2</sub> molarity of 0.1M as precursor and Fer chloride feCl<sub>2</sub> molarity of 0.1 M as dopant.

The study of the physical properties of our films was carried out according to the growth of the grain size and optical gap being that the copper oxide is one of the TCO used (transparent and conductive oxides), the growth rate corresponding to optimal resistivity will be sought.