

# Dielectric and electrical proprieties of Nano-TiO<sub>2</sub> powders and thin films doped by copper at room temperatures

*B. Toubal, R. Bensaha*

Ceramic Laboratory, University of brother`s Mentouri Constantine 1, Algeria.  
toubalbadreddine@yahoo.fr

## **Abstract**

In this work, we have made a parallel study using both powders and thin layers of TiO<sub>2</sub> doped by copper (Cu). Annealing temperatures effects and the Cu dopant concentration on the phase composition, chemical banding and microstructure were characterized by X-ray diffraction, Raman spectroscopy, transmission electron microscopy (TEM) and Atomic force microscopy (AFM). Both the dielectric properties of Cu doped TiO<sub>2</sub> powders and the electrical resistivity of the films were acquired at room temperatures. The details outcome from XRD and Raman spectroscopy display that only the anatase TiO<sub>2</sub> crystallization has been obtained for both films and powders as a function of annealing temperature and the Cu addition. Both the Impedance Spectroscopy and Nyquist diagrams Curves of Cu doped TiO<sub>2</sub> were obtained at room temperature. The electrical resistivity ( $\rho$ ) was found decreasing from  $4.5 \cdot 10^{11}$  to  $8.7 \cdot 10^{10}$  with the annealing temperature and the Cu addition.

**Keywords:** Cu doped anatase TiO<sub>2</sub>, Impedance Spectroscopy, Nyquist diagrams, electrical resistivity ( $\rho$ ).