

# Preparation and Performance of Nickel Oxide Films by Ion Beam Sputtering Deposition and Oxidation Annealing

Jing Peng<sup>1,4</sup>, Zhimou Xu<sup>2,3,\*</sup>, Shuangbao Wang<sup>2,3</sup>, Quanlin Jie<sup>1</sup> and Cunhua Chen<sup>5</sup>

<sup>1</sup>Physical Science and Technology Institute, Wuhan University, Wuhan 430072, China

<sup>2</sup>Wuhan National Laboratory for Optoelectronics, Wuhan 430074, China

<sup>3</sup>College of Optoelectronic Science and Engineering, Huazhong University of Science and Technology, Wuhan 430074, China

<sup>4</sup>College of Sciences, Wuhan University of Science and Technology, Wuhan 430081, China

<sup>5</sup>School of Chemistry, Central China Normal University, Wuhan 430079, China

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Polycrystalline NiO<sub>x</sub> thin films were deposited on quartz substrates by ion beam sputter deposition and oxidation annealing at high temperatures. X-ray diffraction (XRD) and scanning electron microscopy (SEM) morphologies indicate that the as-deposited nickel oxide thin films are flat amorphous nickel or oxides. However, they developed into semiconducting NiO<sub>x</sub> thin films during the oxidation annealing process. Four-point probe tests confirmed their sheet resistance and the resistance-temperature relationship. In addition, infrared (IR) measurements were also carried out in the visible spectrum range to study the optical properties of the as-deposited and annealed films. Apparently, the NiO<sub>x</sub> films obtained by the new method exhibit properties that are comparable to those of the films formed by other methods. The thin films have potential application as gas sensors.

\*Corresponding author: e-mail: xuzhimou2001@yahoo.com.cn