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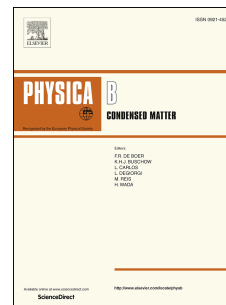


Photo-induced changes in nano-copper oxide for optoelectronic applications

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Abstract

Copper oxide (CuO) nanoparticles (NPs) have been prepared using microwave irradiation. A mother material was copper nitrate in distilled water. X-ray diffraction (XRD) and transmission electron microscopy (TEM) were used for characterizing the NPs powders. Thermal Gravimetric Analysis (TGA) and Differential Thermal Analysis (DTA) were measured for as-prepared CuO NPs. The obtained oxides NPs were confirmed produced during chemical precipitation by these characterizations. These NPs were dropped on top of glass substrate for measuring the optical characterizations. Both linear and nonlinear optical properties of the as-prepared CuO NP films were studied. The optical energy gap of the as-prepared CuO NP films is equal to 3.98 eV, which is higher than that of the bulk material. The effect of ultraviolet (UV) light irradiation on the CuO NP films was investigated at 2 and 5 hours. The optical properties of CuO NP films were measured as a function of these UV irradiation time. It was found that the optical properties of CuO NP films were affected by UV irradiation. The optical constants for as-prepared and irradiated CuO NP films were calculated which reflect the affect of UV irradiation time. As observed from these results, a highly forced for optoelectronic applications.

Keywords: UV irradiation; Optical characterizations; Copper oxide; Nano-particles.

1. Introduction

Nowadays, the oxides such as In_2O_3 , SnO_2 , ZnO , CdO , In_2O and CuO give an interesting aspect because of their of optical and electrical properties [1, 2]. These properties are affected by controlling their nanoscale [2]. Based on metal and/or oxide, these materials have been concerned due to their applications in gas sensing, catalysis, solar energy conversion, and transparent electrode. CuO as one of these metal oxides is a very interesting because of its fundamental and applied senses. In the basic sense, the system has been illustrated from the purpose of being a firmly correlated electron system

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