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SYNTHESIS AND CHARACTERIZATION OF OXIDE NANOPARTICLES FOR ITS APPLICATION IN MEMRISTIVE DEVICES

Abstract: The last few decades have been revolutionary for semiconductor processing and applications due to their extraordinary optical and electronic properties. In this paper, ZnO and PbO nanoparticles are prepared by chemical bath deposition technique. The structural morphologies of the prepared samples are verified with the help of XRD analysis and HRTEM technique. XRD analysis shows the hexagonal structure of ZnO nanoparticles and orthorhombic structure of PbO nanoparticles. The average particle size calculated from the XRD data are found be 28.934 nm for ZnO nanomaterials and 63.11 nm for PbO nanomaterials. HRTEM imaging technique further verifies the structural characterization of the prepared samples. The electrical study is done with the help of an electrometer. The I-V measurement curve shows a zero crossing pinched hysteresis loop. The presence of such a pinched hysteresis loop suggests the existence of memristive properties in the semiconductor nanomaterials. The primary goal of this research work is to synthesize ZnO and PbO semiconductor nanomaterials and analyze their various physical and electrical properties for their applications in memristive devices.

Keywords: ZnO, PbO nanoparticles, quantum confinement, optoelectronics, memristor, hysteresis loop.

Author: Mr ROY CHOUDHURY, JYOTI PRASAD (ASSAM DON BOSCO UNIVERSITY, SONAPUR)

Presenter: Mr ROY CHOUDHURY, JYOTI PRASAD (ASSAM DON BOSCO UNIVERSITY, SONAPUR)

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