

Nanosheet Zinc Oxide Synthesized by Solution-Immersion Method for Triboelectric Nanogenerator

ABSTRACT

Most global problems are being solved by using sustainable energy harvesting technologies to retain the social ecosystem in great condition. The triboelectric nanogenerator (TENG) which is a renewable energy harvesting device, collects the waste mechanical energy from its surroundings and performs the electric signal conversion. TENG have garnered increased attention in recent years by offering prospective use in energy harvesting technology. Particularly, there is a need for flexible energy conversion that serves as a power supply for portable electronic equipment. In this study, ZnO nanosheet thin film prepared on the flexible conductive aluminium foil through a low temperature immersion technique was used to generate electrical energy. The effect of heat treatment on ZnO nanosheet thin film was also investigated on the surface morphology, structural properties and nanogenerator performance. The high density of interconnected ZnO nanosheet were observed before and after heat treatment as confirmed by FESEM studies. The analysis using XRD confirmed that ZnO nanosheet thin film was successfully deposited on the aluminium foil. Additionally, the ZnO nanosheet thin films improved significantly with heat treatment, enhancing their crystalline quality. The triboelectric nanogenerator (TENG) was successfully constructed in contact and separation mode using Kapton tape on top and ZnO nanosheet thin film on the bottom to generate electricity by a force of hand pressing. The output electrical voltage of the device doubled from around 2 V to 4 V after underwent the heat treatment. This study provides an essential insight into fabrication of TENG using the ZnO nanosheet thin film through a clean and effective method for nanogenerator applications.