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Characterization and Fabrication of Piezoelectric Energy Harvesting ZnO Nanorod on Textile by Hydrothermal Method

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Abstract
Recent advancements in sensing technology and wireless communications have accelerated the development of the Internet of Things (IoT) and wearable sensors. Piezoelectric energy harvesting device provides a promising solution for wearable energy harvester. Energy harvesting from wearable textiles can be achieved through various mechanisms, such as piezoelectricity, thermoelectricity, and photovoltaics. Zinc Oxide (ZnO) nanorods structure has garnered considerable interest among researchers in recent years due to its unique and favorable properties. This paper presents a fabrication process of a flexible piezoelectric energy harvester via hydrothermal method to produce ZnO nanorod structure. The electrode fabrication was discussed using screen printing method to grow the ZnO nanorods on top of the electrode surface. The characterization of the ZnO was done by SEM, XRD and piezometer measurement. Based on SEM surface morphology, n comparison to growth durations of 2 and 4 hours, a 6-hour growth period at 85°C results in ZnO nanorods with a more pronounced hexagonal wurtzite structure. The XRD data reveals a prominent 002 peak, indicating c-axis orientation in the ZnO nanorods. © 2023 IEEE.

Author Keywords
energy harvesting; piezoelectric; wearable; zinc oxide nanorods

Index Keywords
Electrodes, Energy harvesting, Fabrication, II-VI semiconductors, Internet of things, Morphology, Nanorods, Piezoelectricity, Screen printing, Surface morphology, X ray diffraction, Zinc oxide; Energy harvesting device, Hydrothermal methods, Piezoelectric, Piezoelectric energy harvesting, Sensing technology, Technology communications, Wearable, Wireless communications, XRD, Zinc oxide nanorods; Textiles

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