World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:10, No:12, 2016

Modeling and Optimization of Nanogenerator for Energy Harvesting

Authors : Fawzi Srairi, Abderrahmane Dib

Abstract : Recently, the desire for a self-powered micro and nanodevices has attracted a great interest of using sustainable energy sources. Further, the ultimate goal of nanogenerator is to harvest energy from the ambient environment in which a self-powered device based on these generators is needed. With the development of nanogenerator-based circuits design and optimization, the building of new device simulator is necessary for the study and the synthesis of electromechanical parameters of this type of models. In the present article, both numerical modeling and optimization of piezoelectric nanogenerator based on zinc oxide have been carried out. They aim to improve the electromechanical performances, robustness, and synthesis process for nanogenerator. The proposed model has been developed for a systematic study of the nanowire morphology parameters in stretching mode. In addition, heuristic optimization technique, namely, particle swarm optimization has been implemented for an analytic modeling and an optimization of nanogenerator-based process in stretching mode. Moreover, the obtained results have been tested and compared with conventional model where a good agreement has been obtained for excitation mode. The developed nanogenerator model can be generalized, extended and integrated into simulators devices to study nanogenerator-based circuits.

Keywords : electrical potential, heuristic algorithms, numerical modeling, nanogenerator
Conference Title : ICMSET 2016 : International Conference on Material Science and Engineering Technology
Conference Location : Paris, France
Conference Dates : December 29-30, 2016

Open Science Index, Materials and Metallurgical Engineering Vol:10, No:12, 2016 publications.waset.org/abstracts/60114/pdf