World Academy of Science, Engineering and Technology
International Journal of Energy and Power Engineering
Vol:14, No:2, 2020

# Surface Integration Effect on Mechanical and Piezoelectric Properties of ZnO

**Authors :** A. Khan, M. Hussain, S. Afgun

**Abstract :** In the present work, the effect of the surface integration on the piezoelectric properties of zinc oxide (ZnO) nanorods has been investigated. ZnO nanorods were grown by using aqueous chemical growth method on two samples of graphene coated pet plastic substrate. First substrate's surface was integrated with ZnO nanoparticles while the other substrate was used without ZnO nanoparticles. Various important parameters were analyzed, the growth density and morphological analysis were taken into account through surface scanning electron microscopy; it was observed that the growth density of nanorods on the integrated surface was much higher than the nonintegrated substrate. The crystal quality of growth orientation was analyzed by X-ray diffraction technique. Mechanical stability of ZnO nanorods on an integrated substrate was more appropriate than the nonintegrated substrate. The generated amount of piezoelectric potential from the integrated substrate was two times higher than the nonintegrated substrate. This shows that the layer of nanoparticles plays a crucial role in the enhancement of piezoelectric potential. Besides this, it also improves the performance of fabricated devices like its mechanical stability and piezoelectric properties. Additionally, the obtained results were compared with the other two samples used for the growth of ZnO nanorods on silver coated glass substrates for similar measurement. The consistency of the results verified the importance of surface integration effect. This study will help us to fabricate improved performance devices by using surface integrated substrates.

**Keywords :** ZnO nanorods, surface integration, mechanical properties, harvesting piezoelectricity
**Conference Title :** ICESET 2020 : International Conference on Energy Systems Engineering and Technology
**Conference Location :** Paris, France
**Conference Dates :** February 20-21, 2020