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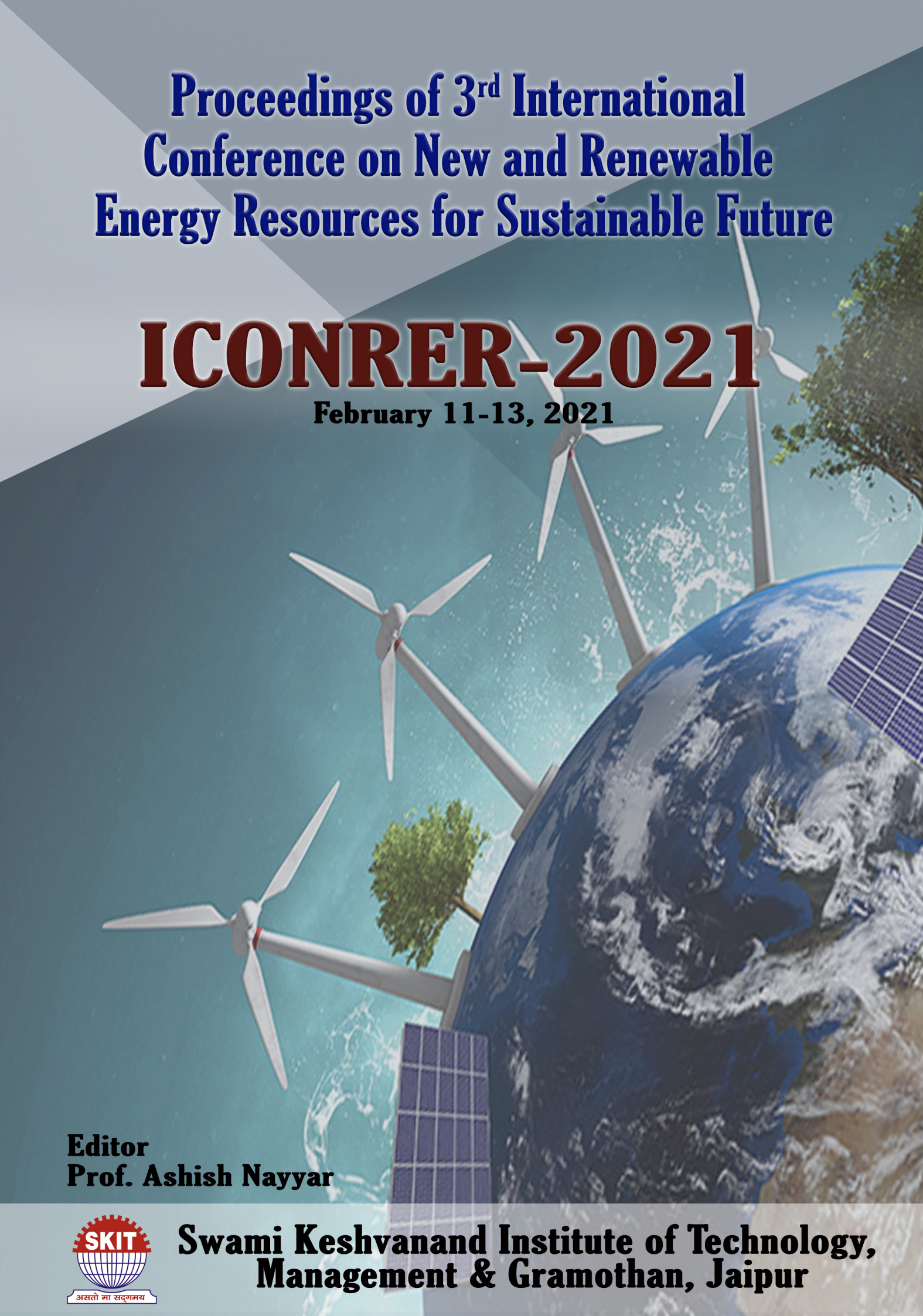

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ZnO/MgO/ITO STRUCTURED SOLAR CELL FOR ULTRAVIOLET PHOTO DETECTOR APPLICATION

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Abstract

ZnO based thin-film transistors have been fabricated by means of the gate dielectric of MgO using E beam deposition. In this work MgO and ZnO, bilayer of 150 nm each have been deposited on ITO glass substrate. MgO layer is supportive to reducing the gate leakage current due to a large band equalize the ZnO channel layer, and to attain high transparency in the visible light band due to a broad bandgap of 7.8 eV. The obtained UV Photodetector gives outstanding UV sensing properties. The improvement of the photoresponsivity of the ZnO UV detector was carried out by the surface treatment of the ZnO thin film. The results show a great extent facilitates the fabrication of significant metal-insulator-semiconductor at low cost and low temperatures and high improvements in the detector performance. The achieved field-effect mobility is 2.70 $cm2V^{-1}s^{-1}$ and on/off current ratio is around 1×10^4 which shows the ZnO-TFTs work in enhancement mode. The threshold voltage is achieved as 5.1 V. The electrical results of ZnO/MgO-TFTs are predictable to get better additional by optimizing expansion circumstances.

Keywords: Thin-film transistors, E beam deposition, UV Photo detector, Metal-insulator-semiconductor

INTRODUCTION

Recent researches have emphasis towards fabrication of heterojunctions combining ZnO with other semiconductor material. ZnO is a most commonly used for the applications of optoelectronic devices as UV photo detectors. UV response of ZnO film is used to determine the photoconductivity. ZnO-based UV photo detectors need comparatively extended response time. From the previous research it has been pursue that fabrication of heterojunctions is used to improve concert of UV detectors. It has been revealed that hetero-junction of ZnO/MgO is used to design fundamental photo electronic devices. There are so many techniques have been adopted to fabricate ZnO/MgO heterojunction structures. TFTs (thin-film transistors) have been fabricated using active channel layer made with polycrystalline materials or amorphous silicon. Silicon is commonly used because of the light sensitivity. TFTs based on ZnO thin films on the transparent films area better way out and intensively deliberate also fabricated using a variety of methods.

ZnO is used like active layer in the transparent TFTs for its important advantages in photoelectric field, like large band gap around 3.3 eVand elevated on/off ratio. To improve the device performance insulating layer of TFTs is very important.

In Comparison with conventionally available gate dielectric materials as SiO_2, MgO has extremely ionic insulating rock salt-structure through good Physical or Chemical stability. MgO has bandgap of 7.7 eV is beneficial to a superior transparent rate for visible light. So MgO has high dielectric constant around 9.8 as compared to SiO2 which is 3.9 it means that MgO offers

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Renewable energy and sustainable development are the key technologies to offer solutions to the ever-increasing environmental pollutions and depleting conventional fuel reserves. With an aim to discuss the state of art technologies pertaining to the renewable energy domain, RTU (ATU) TEQIP III Sponsored 3rd International Conference on New and Renewable Energy Resources for Sustainable Future (ICONRER-2021) was organized by the Department of Mechanical Engineering, Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur in collaboration with Rajasthan Technical University and Department of Mechanical Engineering, Assiut University, Assiut (Egypt) from February 11 to 13, 2021. ICONRER is a series of the conference started in 2017 and it was 3rd event of that series.

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