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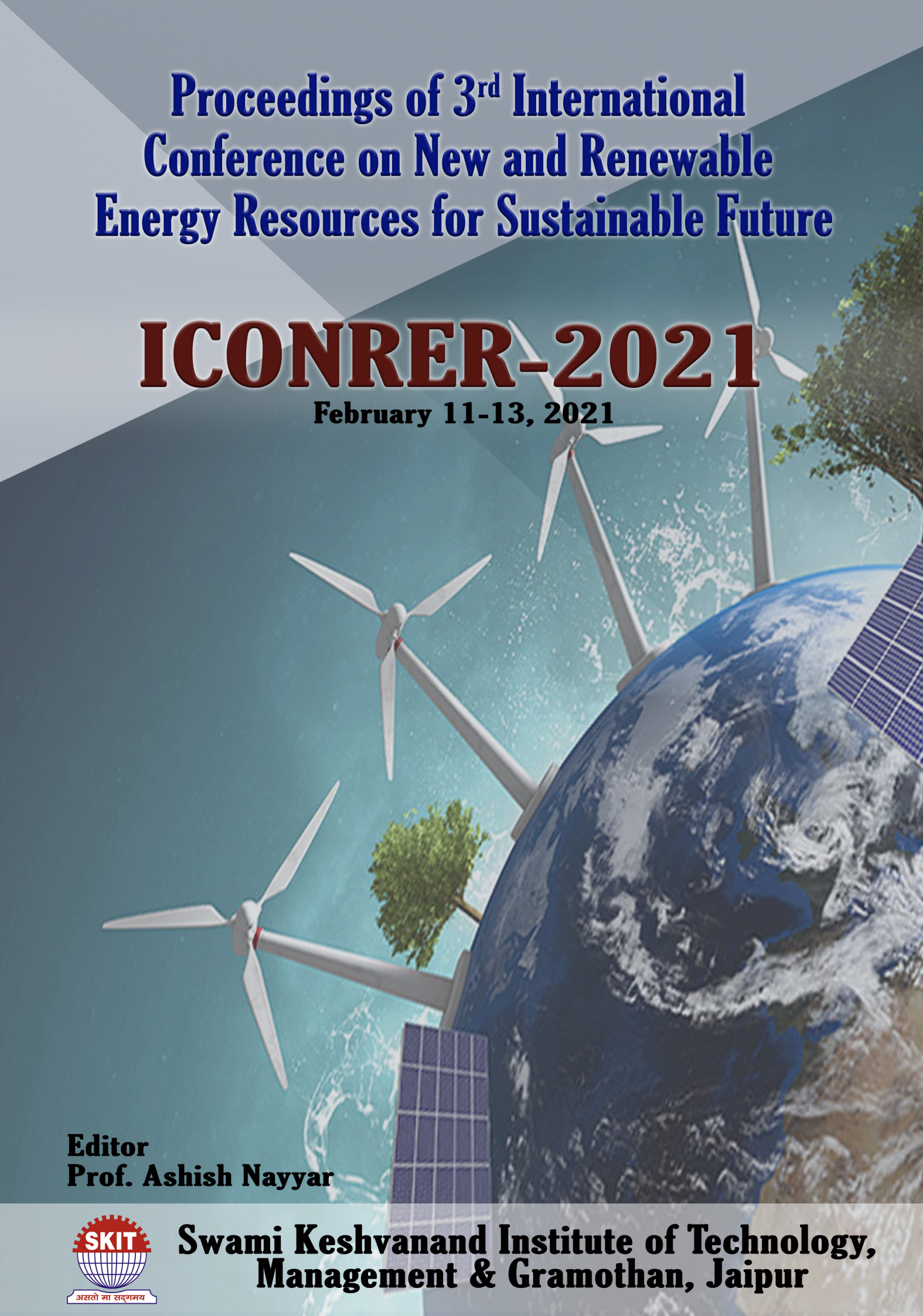

Editor
Prof. Ashish Nayyar

Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

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ELECTRICAL CHARACTERISTICS OF CdS/CdTe BASED INORGANIC SOLAR CELLS: EFFECT OF CdS LAYER THICKNESS

Pankaj Kumar[1], Rahul Pandey[2], Neeraj Jain[3], Praveen K. Jain[4]
[1,2,3,4]Department of Electronics & Communication Engineering,
Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur
Corresponding Author email:rahul.pandey@skit.ac.in

Abstract

Thin film solar cells have the potential to replace conventional Si p-n junction solar cells due to their cheap cost, high stability, and high efficiency. The impact of scaling the thickness of the CdS window layer (from 50 to 150 nm) in a CdTe-based solar cell was investigated in this study. The primary absorbent layer of CdTe was maintained at a thickness of 1 m. Solar simulator was used to light the gadget (Xe- source of light). Adjustment of the light intensity to 100 mW/cm^2 was made. The absorption spectra of a CdS thin film were determined using a UV-Vis-NIR spectrophotometer (wavelength range: 200 nm to 1200 nm).

Keywords: **Inorganic Solar Cell, CdS/CdTe**

INTRODUCTION

The photocurrent efficiency of thin film solar cells is strongly reliant on the quality and thickness of the window layer. The traditional solar cell needs an optimal thickness of window layer between the absorber layer and the transparent front contact layer to maximize efficiency. It effectively drives out photogenerated carriers while coupling light to the junction with minimal absorption losses, producing in a solar cell with a high efficiency. Due to the existence of a buffer layer with a wide band gap in contrast to an optimal low bandgap absorber layer, thin film heterojunction solar cells focus more light toward the junction. The mismatch in lattice structure and the differential in thermal expansion coefficient between the absorption and window layers should also be minimized [1-8]. After weighing all of these factors, we chose CdS as the window layer. This layer also serves as an electron transport layer in the solar cell construction that has been developed. We used MoO3 as the hole transit layer. The final solar cells are composed of ITO/CdS/CdTe/MoO3/Al.

Nowadays, the compound semiconductor materials have been widely used in various fields like energy, environmental and biomedical. Among this widely used composite semiconductor, CdTe has attracted more attention compared to other materials due to its suitable direct-energy band-gap i.e.1.45 eV at room temperature, high absorption coefficient and higher chemical stability. CdTe is advantageous for research purposes since it is a low-cost technology for large-scale solar cell manufacturing. As a result, high-quality CdTe thin films are extensively utilised in a variety of electrical and large-area optoelectronic devices such as solar cells, infrared windows, photo detectors, LEDs, and lasers.Photovoltaic cell converts photon input into current or voltage. It generates voltage or current when sunlight or photon is injected in it. We can use a photovoltaic solar cell in less calibrate exhilaration uses like computer, watches and remote power etc [9-17].

ICONRER-2021

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.

Swami Keshvanand Institute of Technology, Management & Gramothan

Ramnagaria, Jagatpura, Jaipur-302017, Rajasthan

Tel. : +91-0141- 3500300, 5160400, 2759609, 2752165 & 2752167 | Fax: +91-0141-2759555

Website: www.skit.ac.in | E-mail: info@skit.ac.in

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