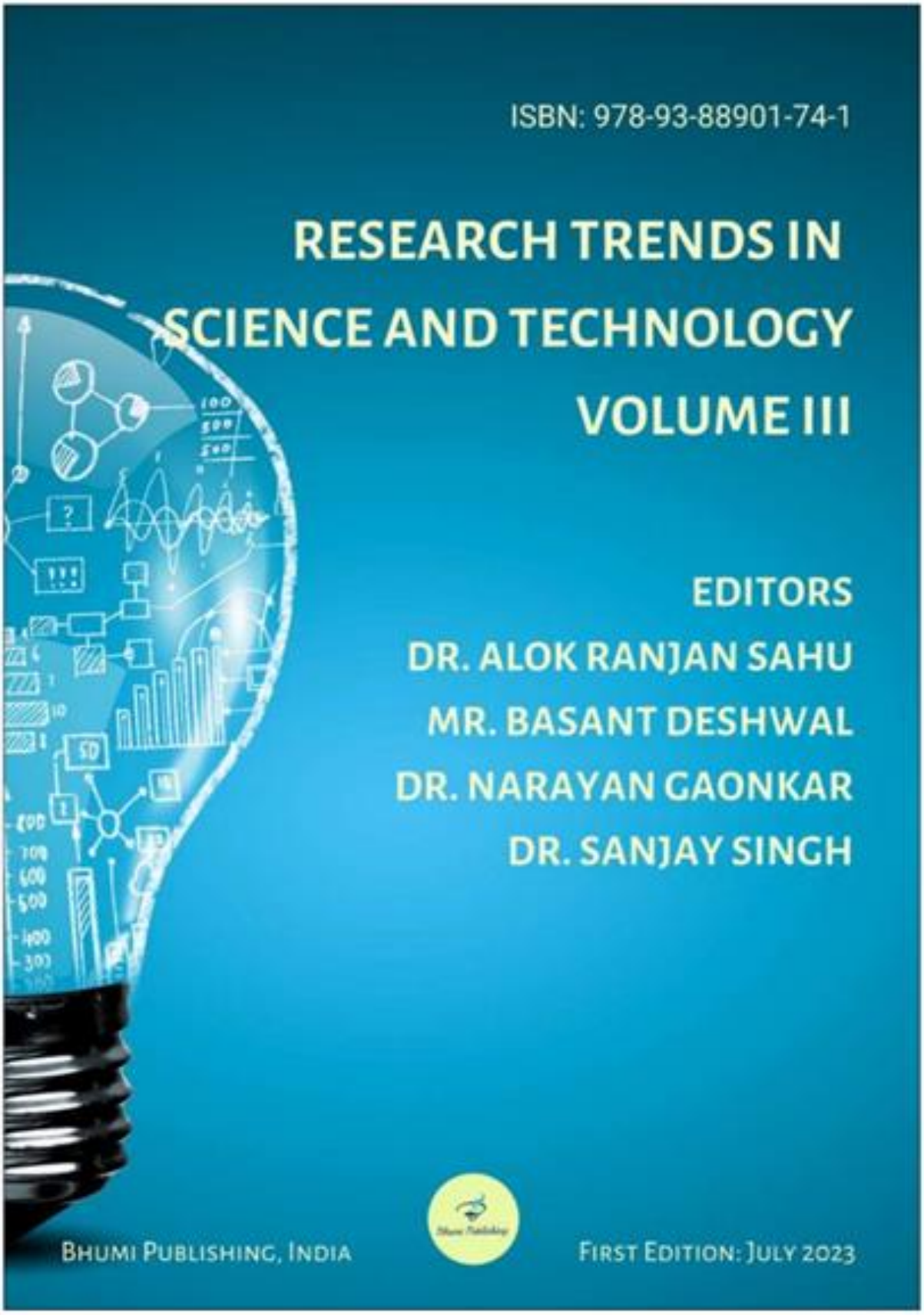
Dr. K.R. Nemade: Cutting-Edge Progress In Tandem Solar Cell Innovation



First Edition: July, 2023

ISBN: 978-93-88901-74-1

Published by:

Bhumi Publishing,

Nigave Khalasa, Kolhapur 416207, Maharashtra, India

Website: www.bhumipublishing.com

E-mail: bhumipublishing@gmail.com

Book Available online at:

https://www.bhumipublishing.com/book/

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CUTTING-EDGE PROGRESS IN TANDEM SOLAR CELL INNOVATION

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Abstract:

The demand for efficient and sustainable energy sources has spurred remarkable advancements in photovoltaic technology, particularly in the field of tandem solar cells. This research paper delves into the cutting-edge progress made in tandem solar cell innovation, exploring the latest developments, breakthroughs, and challenges in this rapidly evolving domain. Tandem solar cells, also known as multi-junction solar cells, offer the potential to surpass the efficiency limitations of traditional single-junction cells by stacking multiple sub-cells, each optimized for a specific portion of the solar spectrum. This chapter comprehensively reviews the state-of-the-art materials, design strategies, and fabrication techniques employed in tandem solar cell architectures. By critically evaluating the progress and prospects of tandem solar cell innovation, this research paper offers valuable insights into the future direction of photovoltaic technology. The synthesis of recent developments and emerging trends serves as a guide for researchers, engineers, and policymakers seeking to accelerate the deployment of high-efficiency solar energy solutions and drive the transition towards a sustainable energy landscape.

Keywords: Energy Conservation; Tandem Cell; Solar Cell

Introduction:

Energy conservation is a crucial and pressing need in today's world due to a myriad of reasons that encompass environmental, economic, and social dimensions. As global energy demand continues to rise, it is imperative that we adopt strategies to conserve energy and utilize it more efficiently. First and foremost, environmental concerns are at the forefront of the energy conservation movement. The excessive consumption of non-renewable energy sources, such as fossil fuels, leads to detrimental effects on the planet. Burning fossil fuels releases greenhouse gases into the atmosphere, contributing to climate change, air pollution, and the depletion of natural resources. By conserving energy, we can reduce our carbon footprint and mitigate the impact of climate change, thus preserving a habitable planet for future generations.

Economic factors also play a significant role in the necessity of energy conservation. Energy production and distribution require substantial financial investments, and high demand can strain energy infrastructure. By conserving energy, we can alleviate the pressure on energy grids, reduce the need for expensive infrastructure upgrades, and ultimately lower energy costs for consumers. Moreover, energy efficiency measures in industries and households can lead to substantial cost savings over time, enhancing economic stability and resilience [1].

Research Trends in Science and Technology Volume III (ISBN: 978-93-88901-74-1)

About Editors

Dr. Alok Ranjan Sahu serves as an Assistant Professor in Botany at Vikash Degree College, Bargarh, Odisha. He received M.Sc., M.Phil. (Life Science) and Ph.D. in Biotechnology from the School of Life Sciences, Sambalpur University, Odisha, India. He has published more than 45 research papers in National and International Journals and Books. He also has obtained three National Patents and filed one Patents to his credit. He is the sole author of two books and co-author of four books. He is a Fellow and Life member of Six reputed International and National Academic Societies. He is a Reviewer and Editorial Board Member of more than 30 numbers of National and International Journals, including Biology, Genes, Biomolecules, Sustainability, BABT, JAPS, JABB, etc. For his outstanding research contribution, he was awarded Research Excellence Award-2023, Academic Excellence Award (Botany/ Plant Biotechnology)-2022, Young Achiever Award-2022, Outstanding Scientist Award-2022, Best Faculty Award-2021, Young Plant Breeder Award-2021, Best Researcher Award-2020, Young Scientist Award-2014, Best Poster Presentation Award-2013. His current areas of research interest are Plant Molecular Biology & Genome mapping, Medicinal Plant Conservation, Natural products & therapeutics.

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ISBN 978-93-88901-74-1