ISBN: 978-93-94638-88-4

Multifaceted Applications of Chemical Sciences

Multifaceted Applications of Chemical Sciences

First Edition

Editors

Prof. R. K. Singh, Prof. M. Ansari, Dr. Sadguru Prakash, Dr. S. K. Mishra, Dr. Basant Kumar, Dr. Rishi Ranjan Pandey, Dr. Jitendra Kumar

Co-Editors

Dr. Amit Kumar Verma, Ms. Saakshi Sharma, Dr. Arun Kumar

Faculty of Science, M.L.K.P.G. College
Balrampur, Uttar Pradesh, India.

ISBN: 978-93-94638-88-4

Multifaceted Applications of Chemical Sciences

First Edition

Editors

Prof. R. K. Singh
Prof. M. Ansari
Dr. Sadguru Prakash
Dr. S. K. Mishra
Dr. Basant Kumar
Dr. Rishi Ranjan Pandey
Dr. Jitendra Kumar

Co-Editors

Dr. Amit Kumar Verma
Ms. Saakshi Sharma
Dr. Arun Kumar

Thanuj International Publishers,
Tamil Nadu, India

First published in India in 2024

This First Edition published by Thanuj International Publishers

©2024. Thanuj International Publishers. All rights reserved.

Apart from any use permitted under Indian copyright law, this publication may only be reproduced, stored or transmitted, in any form, or by any means with prior permission in writing of the publishers or in the case of reprographic production in accordance with the terms of licenses issued by the Copyright Licensing Agency.

Copy Right policy is to use papers that are natural, renewable and recyclable products and made from wood grown in sustainable forests. The logging and manufacturing processes are expected to conform to the environmental regulations of the country of origin. Whilst the advice and information in this book are believed to be true and accurate at the date of going to press, neither the Editors and the publisher can accept any legal responsibility or liability for any errors or omissions that may be made. In particular, (but without limiting the generality of the preceding disclaimer) every effort has been made to check quantity of chemicals; however it is still possible that errors have been missed.

ISBN: 978-93-94638-88-4

Price: Rs: 850.00

Published by:

Thanuj International Publishers,
8/173-B, Vengayapalayam, Kakkaveri, Rasipuram,
Namakkal, Tamil Nadu,
India – 637406.
www.darshanpublishers.com
E-mail: thanujinternationalpublishers@gmail.com

Printed by:

Dhazh Computers (Graphic Designer)
No: 442- A, 10th East Cross Street,
Munthirithoppu, Annanagar,
Madurai – 20, Tamil Nadu, India.
E-mail: narennarayanasamy@gmail.com

Optimizing solar panel efficiency: A comparative study of novel photovoltaic materials and natural energy

Kishor Nand[#,*], Firoz Hassan[#] and Md. Rashid Tanveer[†]
[#]Department of Chemistry, Integral University, Lucknow-226026, UP (INDIA)
[*]Department of Chemistry, V. B. S. Govt Degree College, Campierganj, Gorakhpur-273158, UP (INDIA). E-mail: kishorenandgdc@gmail.com
[†]Department of Chemistry, St. Andrew's College, Gorakhpur-273001, UP (INDIA)
Email id: *kishorenandgdc@gmail.com*

Abstract

Solar energy holds immense potential as a sustainable and renewable energy source, yet optimizing the efficiency of solar panels remains a critical challenge. This comparative study explores the efficacy of novel photovoltaic materials in enhancing solar panel performance. The research investigates a range of emerging materials, including perovskite, organic, and quantum dot-based solar cells, alongside traditional silicon-based cells. The study employs a comprehensive comparative analysis framework to evaluate the efficiency, cost-effectiveness, stability, and scalability of these materials. Experimental data, theoretical modeling, and simulation techniques are integrated to provide a holistic understanding of each material's performance under varying conditions. Key parameters such as power conversion efficiency, spectral response, and environmental stability are thoroughly examined to assess the suitability of each material for practical solar energy applications. Furthermore, the study investigates manufacturing processes, material availability, and environmental impacts to provide insights into the feasibility of large-scale adoption.

Key words – Solar cell, photovoltaic, geothermal, hydropower, nuclear energy, fossil fuels.

Introduction

Energy is the key to economic growth, and energy consumption is closely related to the future development of the country. But in a developing country like India, there is greater powercrisis. Even though the generation

22. Li J., Tarpani R.R.Z., Stamford L., Schmid A.G., (2023), **Sustainable Production and Consumption** 35: 141- 156.

23. Xie Y, Nie Y, Li T, Zhang Y, Wang J,(2023), **Renewable Energy,** 212:57-69.

24. Li K, Liu C, Jiang S, Chen Y,(2020), **Journal of Cleaner Production,** 250 :, 119481.

25. Singh, H.K., Chandrasekharam, D., Trupti, G. Mohite P., Singh B., Varun C., Sinha S.K.. (2016), **Current Sustainable Renewable Energy Rep** 3: 80–91.

26. Sarolkar, P. B. (2018), In Proceedings of 43rd Workshop on Geothermal Reservoir Engineering.p1-4.

27. Singh, H. K., Chandrasekharam, D., Trupti, G., Mohite, P., Singh, B., Varun, C., & Sinha, S. K. (2016) **Current Sustainable/Renewable Energy Reports**, 3: 80-91.

28. Razdan, P. N., Agarwal, R. K., Singh, R. (2008). **Earth Science India**, 1(1):30-42.

29. Prajapati, M., Shah, M., Soni, B. (2022), **Environ Sci Pollut Res** 29, 67675–67684.

30. Yadav K, Sircar A., (2021), **International Journal of Geoheritage and Parks,** 9(1) : 93-107.