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Biodegradable Solar Panel Design: A Path to Accessible Renewable Energy in India

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The growing global demand for renewable energy highlights the urgent need for solar technologies that are both environmentally sustainable and economically accessible. In India, despite abundant sunlight, the widespread adoption of solar panels remains limited due to high production and installation costs. Conventional panels rely on silica as a protective material for the photovoltaic junction, ensuring durability and light transmission. However, silica is costly to process and contributes to long-term environmental challenges through electronic waste. This study explores the replacement of silica with biodegradable protective materials that can replicate the structural and optical functions of silica while reducing production costs and minimizing ecological impact. Unlike earlier international efforts that remain at the experimental stage, this work focuses on adapting biodegradable materials for practical application in the Indian context. The primary objective is to design solar panels that are not only sustainable but also affordable, making clean energy accessible to a broader population. By bridging the gap between laboratory research and real-world implementation, this study proposes a novel pathway toward greener, cost-effective solar technology. The expected outcome is a scalable model of biodegradable solar panels that aligns with India's energy needs while addressing global concerns of sustainability and waste reduction.

Keywords: Biodegradable materials, Solar panels, Sustainability

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