

Life Cycle Assessment Investigating the Design and Synthesis of Eco-Friendly and Efficient Organic Photovoltaic Materials for Renewable Energy Applications

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Abstract: *This research delves into the design and synthesis of organic photovoltaic materials for renewable energy. The focus is on creating eco-friendly compounds to improve the efficiency of solar cells, contributing to the advancement of sustainable energy solutions. This research project centres on the advancement of organic photovoltaic materials with the primary goal of enhancing the efficiency and sustainability of solar energy conversion. The study involves the systematic design and synthesis of novel organic compounds tailored for use in photovoltaic devices. The methodology encompasses the exploration of diverse molecular structures, seeking optimal combinations that exhibit high light absorption, charge transport, and stability. Through a comprehensive analysis of their electronic and photo physical properties, the aim is to identify materials that can effectively convert sunlight into electrical energy. Furthermore, the research addresses the environmental impact of these materials by emphasising eco-friendly synthesis routes and recyclability. The investigation considers the life cycle assessment of the materials, ensuring a holistic approach towards sustainability. The outcomes of this research aim to contribute valuable insights into the development of efficient and environmentally friendly organic photovoltaic materials, fostering progress in the field of renewable energy technologies*



Keywords: Organic Photovoltaics, Sustainable Energy, Solar Cells, Molecular Design, Charge Transport, Efficiency Enhancement, Eco-friendly Synthesis, Renewable Energy, Photo physical Properties