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Fabrication of Nanocellulose Paper from Plant Sources for Energy Devices

Technological advances in the 21st century have catapulted, and the extent of electronic waste has increased significantly. Toxic heavy metals and carcinogens are a leading cause of chronic ailments like cancer and organ dysfunction. In this seminar, I will shed light on an eco-friendly devised substrate nano paper which can be incorporated into bio-electronic devices which disintegrate in the surroundings with minimal threats to the ecosystem.
Organic electronics derived from cellulosic fiber have gained significant traction predominantly due to their outstanding tunable mechanical and optical properties, giving rise to electronic devices such as organic solar cells. Recently, Perovskite Solar Cells (PSCs), as a photoelectric converter, have demonstrated considerable power energy conversion and biodegradability compared to conventional silicon solar cells. One such substrate for the PSC is cellulose-based nanopaper derived from different plant sources. The next generation of printable and flexible solar cells use the nanopaper due to its high thermal stability, surface energy, and attenuated optical assets.
Cellulose fibers are extracted through vigorous chemo-mechanical treatments under harsh conditions and bleached before fibrillating into nanoscale (CNF) through mechanical disintegration, which is then subjected to compression.
These nanocellulose thin films are hazy-transparent and have large light scattering characteristics due to their porous structures. This makes it suitable for solar cells as it increases the optical path of incident light. CNPs (cellulose nanopaper) pressed at different temperatures (and pressure) produce papers of different properties. Hence, these impart strong support to the active layers of the solar cell. This research extensively discusses the high mechanical strength and optical traits revealed by nano papers, focusing on their size and properties. Further research is carried out to enrich the barrier and optical properties of nanopaper to refine it for industrial scaling.

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