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Photogalvanic cells: Renewable and future energy devices for solar power and storage

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Photogalvanic cell is a dye sensitized photo-electrochemical cell chargeable in light for solar power generation and storage. A photogalvanic cell consists of H-shaped glass tube containing two electrodes dipped in solution of dye, reductant, NaOH and surfactant (if used). Rabinowitch suggested that the photogalvanic effect might be used to convert sunlight into electricity. To explore this suggestion, some photogalvanic cells using the iron-thionine system as the photosensitive fluid were tested. The observed electrical parameters (like power, etc.) were very low. Despite it, these cells have been considered energy source for the future if their electrical performance is increased. Because of this, lot of work has been done by using various dyes, reductants, and surfactants. I have also done lot of work by using various dye photosensitizers (like Brilliant Cresyl Blue, Rhodamine B, Fast Green FCF, etc.) with Fructose reductant and NaOH alkaline medium. Radically high cell performance-potential 1.07 V, short-circuit current density 12.15 mAcm-2, power 3.05 mWcm-2, efficiency 7.58% and storage capacity 3.6 hour was observed. It is viewed that the photogalvanic cells, with additional advantage of low cost, chargeable/rechargeable in diffused light and storage capacity, can give electrical output comparable to that for commercially used power storage property lacking photovoltaic cells. But to realize this aim, further enhancement in electrical out put of these cells is needed. The option of use of diversity of chemicals like dye, reductant and surfactant has already been exhausted. Therefore, the design and use of alternative/new electrodes may be tried.

Biography

Pooran Koli has completed his PhD on solar power and storage through the photogalvanic cells from the JNV University, India. He is senior Assistant Professor in Dept. of Chemistry of JNV University. He has fabricated photogalvanic cells having highest electrical out put in the world. He has to his credit more than ten articles published in reputed international journals like Fuel, Renewable Energy, Applied Energy, etc. Other than scientific contributions, he is also a social activist, and expert on Indian Constitution, and Reservation policy. He has authored three books on Reservation policy in India (first of its kind books in India).

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