STUDIES ON ENERGY CONVERSION DEVICES BASED ON ORGANIC PHOTOVOLTAIC MATERIALS

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ABSTRACT

In view of the ra-idly depleting oil and natural gas resources, it is becoming apparent that additional sources of energy will have to be developed to meet the demand for energy in the next century. One abundant source is the radiant energy from the sun. A scheme whereby radiant energy is converted directly to electrical energy has obvious attractions. Unfortunately, the cost per peak watt delivered for silicon solar cell is estimated at the present time to be in the region of Rs.100-200 because of high fabrication costs. Organic materials can be readily and inexpensively fabricated in the form of large area thin films and photovoltages can be generated in response to radiation in the UV and visible region. Though the present state-of-the-art photovoltaic energy conversion efficiency is low, they hold great promise for the future.

The objective of this work is to develop a better understanding of the photovoltaic behaviour of aromatic hydrocarbons. The effect of impurities and hetero atoms has been considered by studying anthraquinone and that of doping via iodine complex.

It has been shown that the conduction observed in anthraquinone is basically due to the impurities. Ultra pure anthraquinone has been shown to behave like an insulator; this has been confirmed by dielectric

studies. Photovoltages upto 270 mV have been obtained but the current was always in pico amperes. However, doping showed substantial increase in the output voltage and current. The high resistivity of the material has been shown as the major limiting factor. In conclusion it has been suggested that sensitized, high conductivity, aromatic hydrocarbons could be effectively used as solar cells.

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