



Advances in OptoElectronics

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Review Article

Recent Advances in Organic Solar Cells

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Abstract

Solar cells based on organic semiconductors have attracted much attention. The thickness of the active layer of organic solar cells is typically only 100 nm thin, which is about 1000 times thinner than for crystalline silicon solar cells and still 10 times thinner than for current inorganic thin film cells. The low material consumption per area and the easy processing of organic semiconductors offer a huge potential for low cost large area solar cells. However, to compete with inorganic solar cells the efficiency of organic solar cells has to be improved by a factor of 2-3. Several organic semiconducting materials have been investigated so far, but the optimum material still has to be designed. Similar as for organic light emitting devices (OLED) small molecules are competing with polymers to become the material of choice. After a general introduction into the device structures and operational principles of organic solar cells the three different basic types (all polymer based, all small molecules based and small molecules mixed with polymers) are described in detail in this review. For each kind the current state of research is described and the best of class reported efficiencies are listed.