

Development of Printed Organic Solar Cells in Victoria, Australia

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In recent years there has been a strong interest in the development of low cost large area thin film organic solar cells. In this presentation a summary of progress in assembling small laboratory-based efficient bulk heterojunction solar cells will be reported. The design principles for such solar cells have been well established and depend on the choice of well-ordered high mobility organic semiconductors. A bulk blend of donor and acceptor materials with the appropriate offsets of highest occupied (HOMO) and lowest unoccupied (LUMO) molecular orbital energy levels with suitable charge transporting layers and metallic contacts (one of which must be transparent) can now deliver energy conversion efficiencies in excess of 10%. The presentation will describe the development of efficient laboratory scale bulk heterojunction and perovskite-based thin film solar cells. Finally an account of the scaling up of prototype bulk heterojunction solar cells through roll-to-roll printing on a polyethylene terephthalate substrate coated with indium-tin oxide will be described. Studies on encapsulation and lifetimes will be reported.