Poster presentation

Dramatically improving the stability of transparent silver electrodes for high performance organic photovoltaics using a molecular monolayer

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Organic photovoltaics (OPVs) have strong potential for applications in transportation, consumer electronics and certain buildings integration applications, due to their very low profile, light weight, amenability to colour tuning and use of non-toxic materials. At the same time silver (Ag) films with a thickness of 6-11 nm are promising as the basis for flexible transparent electrodes well-matched to the needs of OPVs, not least because they can be fabricated by vacuum evaporation which is proven as a low cost method for the large area deposition of metal films. However, due to the high surface energy of silver and its slow rate of oxidation in air, very thin evaporated Ag films are morphologically unstable even at room temperature. Consequently, for practical application there is a need to identify an easily implementable and versatile means of imparting long term stability. This talk will describe how a single layer of a bifunctional small molecule deposited from the vapor phase can greatly enhance the morphological and chemical stability of optically thin Ag film electrodes. Due to its very low thickness (~1 nm) this organic layer does not electrically isolate the electrode. It is shown that in 10% efficient inverted, top-illuminated and semi-transparent OPVs substantial improvements in device stability are achieved by inclusion of this layer, which is remarkable give its very low thickness.