

Influence of the exciton blocking layer on the stability of layered organic solar cells

Lare, Y., Kouskoussa, B., Benchouk, K., Djobo, S. O., Cattin, L., Morsli, M., ... & Bernède, J. C. (2011). Influence of the exciton blocking layer on the stability of layered organic solar cells. *Journal of Physics and Chemistry of Solids*, 72(2), 97-103. <10.1016/j.jpcs.2010.11.006> Accessed 20 Jul 2021.

Abstract

The life-time of multi-layer organic solar cells based on the couple donor acceptor copper phthalocyanine/fullerene is studied as a function of the nature of the exciton blocking layer (EBL). It is shown that organic EBL are more efficient than are the inorganic In₂S₃ EBLs. Moreover among the organic EBL, Alq₃ is the most efficient EBL protecting layer. An organic solar cell's lifetime depends on oxygen- and water-contamination of the organic materials. The solar cell's degradation may correspond to bulk or interface phenomena. Using equivalent electrical schemes of solar cell diodes, we show that the structure degradation is mainly related to bulk modification. It is proposed that oxygen- and water-diffusion into the C₆₀ induce a large increase in its resistivity and, therefore an increase in the series resistance, which decreases the solar cell efficiency. In the case of In₂S₃ EBLs, the degradation law predicts that with time two different phenomena will be present. The classical oxygen- and water-diffusion into the organic material, during the first hour of air exposure, leads to a modification in the In₂S₃ EBL/organic interface properties.

Keywords

A. Thin films, A. Interfaces, A. Fullerenes, B. Vapour deposition, D. Electrical properties.