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Original Paper

Comparative study of dielectric functions of complex organic heterostructures

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Abstract

Organic/organic heterostructures and mixed layers were prepared by organic molecular beam deposition (OMBD) in high vacuum (HV) on hydrogen passivated (111) oriented silicon. The substrates were kept at room temperature during the deposition. The organic superstructures consisting in alternative layers of tris-(8-hydroxyquinoline)-aluminum(III) (Alq_3)/N,N'-Di-[(1-naphthyl)-N,N'-diphenyl]-(1,1'-biphenyl)-4,4'-diamine (α -NPD) and 3,4,9,10-perylenetetracarboxylic dianhydride (PTCDA)/copper phthalocyanine (CuPc) were investigated by means of spectroscopic ellipsometry in the 0.73-5 eV spectral range. Additionally reflection infra-red (IR) measurements were performed using p- and s-polarisation.

Taking into account the dielectric function of the single layers the optical response of the Alq_3/α -NPD superstructure can be modeled assuming sharp interfaces. However, for the PTCDA/CuPc superstructure the optical response requires a more sophisticated approach than simply superimposing the responses of the individual layers. The deviation between simulated and experimental data is assigned to the molecular interaction at the interfaces between PTCDA and CuPc. This can affect the molecular orientation and the optical properties. (© 2005 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim)

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