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Photoemission study of Mg/PTCDA/Se–GaAs Schottky contacts

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Abstract

The influence of a very thin PTCDA interlayer on the chemical and electronic properties of Mg/Se–GaAs(1 0 0) Schottky contacts was investigated using soft X-ray photoemission spectroscopy (SXPS). The PTCDA molecules preferentially adsorb at defect sites. Upon Mg deposition a strong intermixing occurs and leads to the formation of MgSe irrespective of the presence of a PTCDA interlayer. The PTCDA interlayer delays the appearance of the metallic Mg feature due to the formation of MgO as a result of the reaction between Mg and PTCDA. The strongest effect of the interlayer on the electronic properties occurs below a Mg coverage of 2.3 monolayer (ML). The rate at which the Schottky barrier height reaches the final value is slower in the presence of the PTCDA interlayer, which is consistent with the delay of the appearance of metallic Mg. In addition, it is found that the submonolayer coverage of PTCDA prevents the Mg induced surface states observed at the submonolayer coverage of Mg on Se/GaAs(1 0 0) surfaces.

Author Keywords: Photoemission; Organic modification; Mg/Se–GaAs(1 0 0) Schottky contacts

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