SR measurements on SrF_2 thin films deposited on InP(111)

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The alkaline earth fluorides are promising materials for insulating layers on semiconductors. There are several papers published on the properties of SrF_2 on InP(100) [1], but little is known about the system SrF_2 on InP(111). To fill this gap we studied the growth of SrF_2 on InP(111). SrF_2 was deposited at room temperature on HF etched as well as on As treated InP and then annealed at 500°C. Subsequent photoelectron spectroscopy measurements, performed at the beam line BL-1A of the Photon Factory, revealed information about chemical bondings at the interface and about the morphology of the film.

Some spectra, measured on an As treated InP(111) surface, are shown in fig. 1. The SRPES-In4d-peak vanishes after deposition of 50Å SrF_2, and no change in its intensity is observed after annealing at 500°C for 10 min., so we conclude the film is continuous. A crystallization effect of up to 1 eV was observed in all measured SRPES spectra after annealing at 500°C.

Additional information was obtained using SEM, TEM, AFM, and RHEED [2]. Fig. 2 shows the AFM pictures obtained for two different surfaces; for SrF_2 deposited on HF etched InP(111) and for SrF_2 on an As treated surface. The measured surface roughnesses Δ are consistent with the SRPES results.

References

[1] S. Heun et al.: Appl. Surf. Sci., in press; and references herein
[2] S. Heun et al.: submitted to J. Crystal Growth

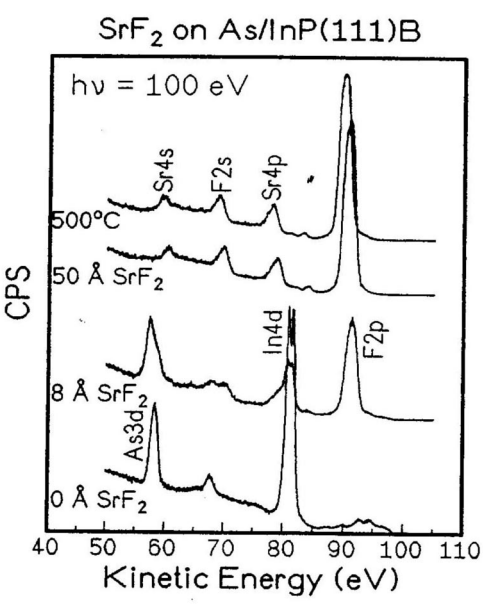

Fig. 1: SRPES spectra of SrF_2, deposited on As treated InP(111). The photon energy was 100eV.

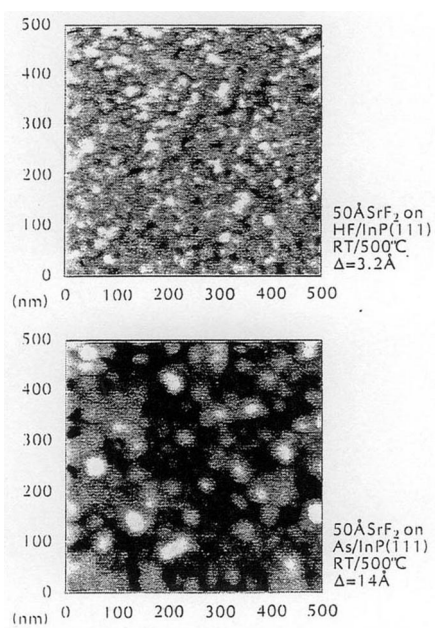

Fig. 2: AFM pictures of two SrF_2 films, deposited on InP(111) surfaces prepared in different ways.