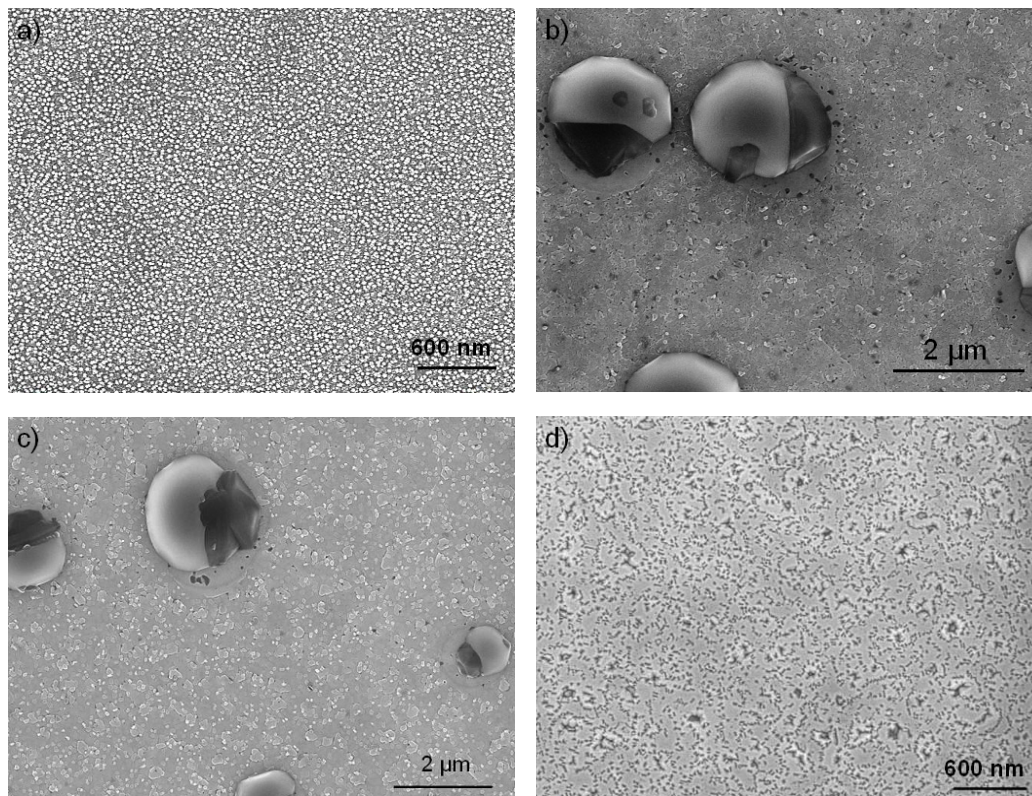


# Epitaxial growth of AlN films on Si (111) and their optical properties

D. Z. Hu,<sup>\*</sup> R. Vöhringer, D. M. Schaadt

*Institut für Angewandte Physik/DFG-Center for Functional Nanostructures  
Karlsruhe Institute of Technology (KIT), Karlsruhe, Germany*

Plasma assisted molecular beam epitaxial growth of AlN on Si(111) at various substrate temperatures with the same III-V ratio is investigated. The epitaxial structures were characterized by high resolution X-ray diffraction (HR-XRD), scanning electrical microscopy (SEM) and atomic force microscopy (AFM). With the increase of the growth temperature, the full-width at half-maximum (FWHM) of the AlN (0002) reflection peak in HR-XRD rocking curve measurements decreases from 5898.5 arcsec for films grown at 575 °C to 1784.9 arcsec for films grown at 900 °C, respectively. AFM images show that the surface roughness decreases with increasing growth temperatures. Though the AlN films are grown with same III-V ratio, SEM images show that there are no metal droplets on top of the AlN films grown at 575 °C and 900 °C, respectively, while there are metal droplets on the films grown at 675 °C and 795 °C, respectively. This information is further confirmed by HR-XRD spectra. The presence of the film morphology can be explained by mobility and evaporation of Al. The Optical properties of the films obtained by spectroscopic ellipsometry measurements will be presented. The effect of the growth temperature on the optical properties will be discussed.



SEM images of AlN films grown on Si(111) at various growth temperatures. While no metal droplets are visible for growth temperatures of (a) 575 °C and (d) 900 °C, they appear at intermediate temperatures of (b) 675 °C and (c) 795 °C.

<sup>\*</sup>D. Z. Hu, e-mail: dongzhi.hu@kit.edu, Tel: +49-721-608-3572