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A study on the interface of AlN/Si

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An AlN has been used not only as a passivaton and insulation of semiconductor, but also as an optical device in the ultravialet spectral region and SAW device. Generally the c-axis oriented single crystal AlN thin film has been grown on the Al_2O_3 substrate. There exist some advantages of the Si substrate over the Al_2O_3, e.g. low cost, high quality large area wafer availibility , and use of integrated process technique. Recently reported velocity of Sezawa wave can be increased 5400m/s which adoptes with ZnO/AlN/Si structure.

In this study, AlN thin film was prepared on Si substrate by reactive RF magnetron sputtering. Chemical state and composition of AlN/Si interface was analysed using XPS(X-ray Photoemission spectroscopy). An excess of nitrogen at the interface is observed, which is probably due to the formation of interface layer constituted mainly Si_xN_y(Silicon Nitride). A film grown at high temperature, interdiffusion of Al atom into the Si substrate is observed, which make the surface rougher. Also, AlN thin film is studied with respect to structure characteristic using RBS(Rutherford Back Scattering) and TEM(Transmission Electron Microscopy), respectly.