Al-Oxynitride buffer layer facilities for PrOx/SiC interfaces

Karsten Henkel, Rakesh Sohal, Carola Schwiertz, Yevgen Burkov, Dieter Schmeißer
Angewandte Physik/Sensorik, Konrad Wachsmann-Allee 17, BTU Cottbus, 03046 Cottbus, Germany

The use of a buffer layer between PrO$_X$ and SiC is necessary as we found destructive interactions like silicate and graphite formation between these materials. We focus on aluminum oxynitride (AlON) as a suitable buffer layer for this high-k/wide band gap system. Its permittivity value and a good lattice matching to SiC should act as benefits for good chemical and electrical properties of the interface.

The AlON layers are prepared by sputtering an aluminum source with nitrogen ions. We report on results achieved by Synchrotron Radiation Photoemission Spectroscopy (SRPES) and on results of electrical measurements, respectively.

In our spectroscopic investigations we found a stable AlON/3C-SiC interface as well as no elemental carbon and silicate distributions in the core levels after thin PrO$_X$ deposition and annealing up to 900°C.

In electrical characterizations of PrO$_X$/AlON stacks on silicon we found already a strong improvement in the leakage current up to values of $10^{-7}$ A/cm$^2$ at an EOT of 4nm. The interface state density could be reduced to mean values of $5\times10^{11}$/eVcm$^2$. Even first results of characterization on SiC will be presented.