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200 nm deep ultraviolet photodetectors based on AlN R. DAHAL, J. LI, Z.Y. FAN, M.L. NAKARMI, J.Y. LIN, H.X. JIANG, Kansas State University — Aluminium nitride possesses the widest direct bandgap ($\sim$6.1 eV) among all semiconductors and appears to be promising material for the development of deep ultraviolet (DUV), vacuum UV and extreme UV (EUV) detectors. Detectors based on AlN would overcome many limitations imposed by Si technology. The 6.1 eV bandgap not only permits the intrinsic solar blindness but also allows the room temperature operation, which relives the requirements of optical filters and cooling system. We report the fabrication and characterization of Metal-Semiconductor-Metal (MSM) deep ultraviolet photodetectors based on high quality AlN epiyayers grown on sapphire substrate using metal organic chemical vapor deposition. The fabricated detectors have 80 μm x 80 μm as an active area with interdigital fingers for Schottky contact with 2 μm/2 μm to 4 μm/ 4 μm finger width/spacing. The photodetectors exhibit lowest cutoff wavelength at 207 nm with peak responsivity at 200 nm. The AlN MSM detectors possess outstanding features such as extremely low dark current, high breakdown voltage, high responsivity, and high UV to visible rejection ratio. These results demonstrate the high promise of AlN as an active material for DUV opto-electronic device applications.

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