Effect of in-situ nitrogen doping into MOCVD-grown Al₂O₃ to improve electrical characteristics of MOSFETs with polysilicon gate

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The effect of nitrogen doping into Al₂O₃ gate dielectric by MOCVD on MOS device characteristics is described for the first time. The nitrogen doped Al₂O₃ MOS has an interface trap density as low as 4.3x10¹⁰ cm⁻²eV⁻¹ that is a half of the non-doped Al₂O₃ (1.0x10¹¹ cm⁻²eV⁻¹), and has less C-V hysteresis of 39 mV than that of 69 mV of Al₂O₃. These improvements are attributed to nitrogen doping into Al₂O₃, which also improve the corresponding MOSFET characteristics of current drivability (Iₘₕ).