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Fabrication and characterization of InAs/AlGaSb HEMTs with high-k gate insulators TOSHIHIKO MAEMOTO, KENJI FUJIWARA, TATSUYA INOUE, NAOKI AMANO, MASATOSHI KOYAMA, SHIGEHIKO SASA, MASATAKA INOUE, OSAKA INSTITUTE OF TECHNOLOGY TEAM — We report on the fabrication and characterization of InAs/AlGaSb high electron mobility transistors (HEMTs) with high-k gate insulators (Al_2O_3 and HfO_2). InAs/AlGaSb quantum well structures were grown by molecular beam epitaxy on a semi-insulating GaAs substrate [1]. From Hall measurements at room temperature, the as-grown wafer showed an electron mobility of 20,000-25,000 cm^2/Vs and a sheet carrier density of 1.0-2.0x10^{12} cm^{-2}. InAs/AlGaSb HEMTs have demonstrated a maximum extrinsic transconductance of 181mS/mm at room temperature. The gate leakage current has been markedly decreased by using thin high-k gate insulators. A typical gate current density of less than 1 nA/mm at room temperature was achieved by inserting the high-k gate insulator. We also found that the leakage current density was smaller than for other experimental results on InAs HEMTs with a Shottky gate [2]. In addition, we evaluated the electron motility and drift velocity by increasing the electronic field between the sources and the drain. [1] T. Maemoto *et al.*, Journal of Physics: Conference Series 38, 112 (2006). [2] J. Bergman *et al.*, 61th Device Research Conference, June 23-25 (2003).

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