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Abstract

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BEOL Compatible Dual-Gate Ultra Thin-Body W-Doped Indium-Oxide Transistor

We experimentally demonstrate BEOL compatible (<250C thermal budget) 1% W-doped amorphous In2O3 (IWO) back-gate (BGFET) and dual-gate (DGFET) field-effect transistors with 7nm channel thickness. The 100nm channel length IWO DGFET exhibits excellent subthreshold slope (SS) of 73mV/dec, record ID,SAT of 370μA/μm, and on-off ratio > $4x10^9$at VDS=1V and VGS-VT=2V. We provide insight into the electrostatic gate control efficiency through temperature and frequency dependent admittance measurement. We identify fundamental transport mechanisms that limit electron mobility in amorphous IWO as a function of gate-bias (VGS) and temperature.