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Characteristic of graphene field effect transistor with ferroelectric gate dielectric SOMYEONG SHIN, HYEWON DU, TAEKWANG KIM, Sejong University, JONG-HYUK YOON, EUN-KYU LEE, SEUNGMIN CHO, Micro device & machinery solution division, Samsung Techwin R&D center, Korea, SUNAE SEO, Sejong University, SAMSUNGTECHWIN R&D CENTER COLLABORATION — The increase of charge carrier concentration along with the mobility is essential to improve the conductance graphene. The replacement of high dielectric constant (high-k) materials provides this but in graphene charge carrier density could be limited by quantum capacitance of graphene with high-k gate dielectric. Y2O3 was one of materials intensively studied. Ferroelectric materials could also provide the other functionality using nonvolatile characteristic of remanent polarization as well as high charge carrier density. Several researches were reported for nonvolatile memory device combined with graphene and ferroelectric. everal previous experimental data seems to show the entangled hysteresis due to ferroelectric polarization and uncontrolled external impurity external charge in the electrical property and significant influences of interface states in ferroelectric and graphene interface.. In this study, we attempt to comprehend complicated hysteresis and the influence of charge carrier concentration by quantum capacitance and interface states qualitatively. We fabricated graphene ferroelectric field-effect transistor (GFFET) with $PtZr_xTi_{1-x}O_3$(PZT) as gate dielectric and studied the effect on the transport property of electron or hoe conduction by interface states and ferroelectric polarization using gate voltage dependent capacitance and current –voltage experimental data at different temperature.

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