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High yield assembly and electron transport properties of reduced graphene oxide field effect transistors DAEHA JOUNG, Univ. of Central Florida, Nanoscience Technology Center and Dept. of Physics , ANINDARUPA CHUNDER, LEI ZHAI, Univ. of Central Florida, Nanoscience Technology Center and Dept. of Chemistry, SAIFUL I. KHONDAKER, Univ.of Central Florida, Nanoscience Technology Center and Dept. of Physics — We demonstrate high yield fabrication of field effect transistors (FET) using chemically reduced graphene oxide (RGO) sheets which is compatible with complimentary metals oxide semiconductor technology. The RGO sheets suspended in water were assembled between prefabricated gold source and drain electrodes using ac dielectrophoresis (DEP). All of the devices showed FET behavior with the application of a gate bias with the majority of them demonstrating ambipolar behavior with a maximum hole and electron mobilities of 4.0 and 1.5 cm^2/Vs respectively. Current-voltage characteristic of the FET devices measured at different temperature follow power law behavior with $I \infty V^n$ with n=1 at low bias while n is as high as 3 at high bias voltage. The temperature dependence of the resistance show Efros-Shklovskii variable range hopping behavior proving that RGO devices are similar to that of disordered granular system. High yield assembly of RGO FET will have significant impact in scaled up fabrication of graphene based nanoelectronic devices.

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