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Electropolymerization of low-k polymer on graphene for top-gated FETs ALEXEY LIPATOV, BENJAMIN B. WYMORE, ALEXANDRA FURSINA, TIMOTHY H. VO, ALEXANDER SINITSKII, JODY G. REDEPENNING, Univ of Nebraska - Lincoln — The most crucial step for field effect transistor (FET) fabrication is forming a thin and uniform layer of insulator on the surface of a body material to separate it from top-gate electrode. Due to hydrophobic and inert nature of graphene it has quickly become a challenge to deposit a uniform dielectric layer with atomic layer deposition (ALD). One promising method to overcome the problems associated with coating graphene is to incorporate a low dielectric constant (low-k) polymer buffer layer or an organic seed layer. This low-k dielectric layer on top of graphene provides the functional groups necessary for the ALD precursors to adhere. In our work we for the first time demonstrate electrodeposition of pinhole free thin (3-4 nm) layers of low-k polymer on monolayer graphene samples. Advantages of the technique include selectivity and scalability. It is possible to deposit the films selectively on a single graphene flake/device, and on a large number of devices simultaneously. The performance of top-gated FET devices demonstrates the utility of electrodeposited polymer films as a dielectric material between graphene and top-gate electrode.

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