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Title:Graphene functionalization and seeding for dielectric deposition and device integration
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Abstract:Graphene has recently attracted wide-spread attention because of its unique transport and physical properties that are appealing for a wide range of electronic applications. Integration with scalable high-κ dielectrics is important for the realization of graphene-based top-gated electronic devices, including next generation THz applications. Atomic layer deposition (ALD), a low temperature deposition method based on two separate self-limiting surface reactions, is a preferred technique to achieve high-quality, conformal, ultrathin dielectric films with precise control of thickness and chemical composition at the atomic scale. Unfortunately, ALD of oxides on graphene is hindered by the inertness of the graphene surface. To alleviate this graphene-oxide incompatibility, several different functionalization and seeding methods have recently been developed to render the graphene more susceptible to the ALD process of high-κ dielectrics including: ozone, wet chemical and fluorine pretreatments, low-k polymer seed, e-beam metal, and oxide seed layers. The ability of each approach to enable conformal, uniform high-κ dielectrics on graphene while maintaining its inherent transport properties for low power, high-frequency device applications is discussed.
Number of references:94
Inspec controlled terms:atomic layer deposition - chemical analysis - fullerene devices - graphene - high-k dielectric thin films - surface chemistry
Uncontrolled terms:graphene functionalization - dielectric deposition - device integration - seeding method - high-K dielectrics - graphene-based top-gated electronic device - next generation THz application - atomic layer deposition - self-limiting surface reaction - ultrathin dielectric films - chemical composition - graphene surface - ALD - wet chemical pretreatment - fluorine pretreatment - ozone pretreatment - low-k polymer seed - e-beam metal layer - oxide seed layer - low power device application - high-frequency device application - C
Inspec classification codes:A6855 Thin film growth, structure, and epitaxy - A7755 Dielectric thin

films - A8115G Vacuum deposition - A8265 Surface chemistry - A8280 Chemical analysis and related physical methods of analysis - B2230F Fullerene, nanotube and related devices
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