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Atomic Layer Deposition (ALD) methods for fabricating graphene devices - theory and experiments YVETTE HANCOCK, Department of Engineering Physics, Helsinki University of Technology, Finland, SAMIUL HAQUE, Nokia Research Center, Helsinki, Finland, MAARIT KARPPINEN, Laboratory of Inorganic Chemistry, Department of Chemistry, Helsinki University of Technology, Finland, ASTA KÄRKKÄINEN, LEO KÄRKKÄINEN, REIJO LEHTENEIMI, PIRJO PASANEN, Nokia Research Center, Helsinki, Finland, JUHO PERÄLÄ, ELINA SAHRAMO, Laboratory of Inorganic Chemistry, Department of Chemistry, Helsinki University of Technology, Finland, KARRI SALORIUTTA, Department of Engineering Physics, Helsinki Univerisity of Technology, Finland —
ALD has the potential to be a well controlled method for coating and patterning graphene structures and making new generation devices. We have investigated the ALD of 5 nm thin coatings of high-k dielectric Al2O3 onto graphene, and have determined the selectivity of the chemical specific deposition, for example, to the edges or starting from defect sites. Experimentally, we see an affinity for Al2O3 to coat the edges of graphene, which is also supported by our ab initio calculations. The affinity of the Al2O3 coating with the edges of graphene allows us to make a mask, which could then be used to fabricate graphene nanoribbons of widths less than 50nm that are also gated.

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