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Metal intercalation-induced selective adatom mass transport on graphene[1] XIAOJIE LIU, Center for Quantum Sciences and School of Physics, Northeast Normal University, Changchun 130117, China , CAI-ZHUANG WANG, MYRON HUPALO, Ames LaboratoryU.S. Department of Energy, and Department of Physics and Astronomy, Iowa State University, Ames, IA 50011, USA, HAI-QING LIN, Beijing Computational Science Research Center, Beijing 100084, China, KAI-MING HO, Ames LaboratoryU.S. Department of Energy, and Department of Physics and Astronomy, Iowa State University, Ames, IA 50011, USA, PATRICIA A. THIEL, Ames LaboratoryU.S. Department of Energy, Department of Chemistry and Department of Materials Science and Engineering, Iowa State University, Ames, , MICHAEL C. TRINGIDES, Ames LaboratoryU.S. Department of Energy, and Department of Physics and Astronomy, Iowa State University, Ames, IA 50011, USA
— Using first-principles calculaitons, we show that partially intercalated graphene, with a mixture of intercalated and pristine areas, can induce an alternating electric field because of the spatial variations in electron doping, and thus, an oscillatory electrostatic potential. This alternating field can change normal stochastic adatom diffusion to biased diffusion, leading to selective mass transport and consequent nucleation, on either the intercalated or pristine areas, depending on the charge state of the adatoms.

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