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Efficient adsorbate transport on graphene by electromigration KIRILL VELIZHANIN, Los Alamos National Laboratory, DMITRY SOLENOV, Naval Research Laboratory — Chemical functionalization of the surface of graphene holds promise for various applications ranging from nanoelectronics to surface catalysis and nano-assembling. In many practical situations it would be beneficial to be able to propel adsorbates along the graphene sheet in a controlled manner. We propose to use electromigration as an efficient means to transport adsorbates along the graphene surface. Within the tight-binding approximation for graphene, parametrized by density functional theory calculations, we estimate the contributions of the direct force and the electron wind force to the drift velocity of electromigration and demonstrate that the electromigration can be rather efficient. In particular, we show that the drift velocity of atomic oxygen covalently bound to graphene can reach up to 4 cm/s for realistic graphene samples. Further, we discuss ways to dynamically, i.e., during experiment, control the efficiency of electromigration by charging and/or local heating of graphene.

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