

Abstract Submitted
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Adsorption of Ammonia on Graphene¹ PRASOON JOSHI, Electrical Engineering Department, Pennsylvania State University, HUGO ROMERO, AWNISH GUPTA, HUMBERTO GUTIERREZ, MILTON COLE, Physics Department, Pennsylvania State University, SRINIVAS TADIGADAPA, Electrical Engineering Department, Pennsylvania State University, PETER EKLUND, Physics Department, Material Science & Engineering Department — We report on experimental studies of NH₃ adsorption/desorption kinetics on graphene surfaces. The study employs bottom-gated graphene field effect transistors (FETs) supported on Si/SiO₂ substrates. Detection of NH₃ occurs through the shift of the source-drain resistance maximum (“Dirac peak”) with gate voltage. The observed shift of the Dirac peak toward negative gate voltages in response to NH₃ exposure is attributed to the charge transfer from adsorbed NH₃, with the amount of charge estimated to be ~ 0.06 electrons per molecule. The desorption kinetics of our FET devices is well described by the sum of two exponential terms corresponding to a fast and a much slower process, whose time constants differ by a factor of ~ 9 . The two-time constant desorption kinetics is consistent with Fickian-type diffusion of NH₃ from the interstitial pockets formed at the interface between the graphene and the supporting SiO₂ gate dielectric.

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