Electronic Supplementary Material (ESI) for Nanoscale.

Supplementary information

Tuning epitaxial graphene sensitivity to water by hydrogen intercalation

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The effect of atmospheric contaminants on the carrier concentration of epitaxial graphene on SiC(0001)

To investigate the effects of the atmospheric contaminants (*i.e.* N_2, O_2, NO_2, and CO_2) magneto-transport measurements were performed on an epitaxial graphene on SiC(0001) sample. The concentrations of CO_2 and NO_2 were chosen to simulate those naturally occurring in ambient air. The effect of O_2 was simulated using synthetic air (SA), which contains 21% O_2, balanced with nitrogen. Prior to each measurement, the sample was annealed at 150°C in vacuum (P=1×10^{-6} mbar) for two hours and then allowing time for the sample to cool down to room temperature. The measurements in figure S1 show a minor p-doping of 1LG due to O_2 in SA, however a significantly larger p-doping effect is observed due to CO_2 and NO_2 exposures, *i.e.* ~13% and ~23% decrease in $(n-n_0)/n_0$, respectively. In the case of 2LG, both NO_2 and CO_2 result in p-doping of graphene (with ~6% and <1% change in carrier concentration, respectively). These measurements demonstrate the thickness dependent atmospheric doping on epitaxial graphene.

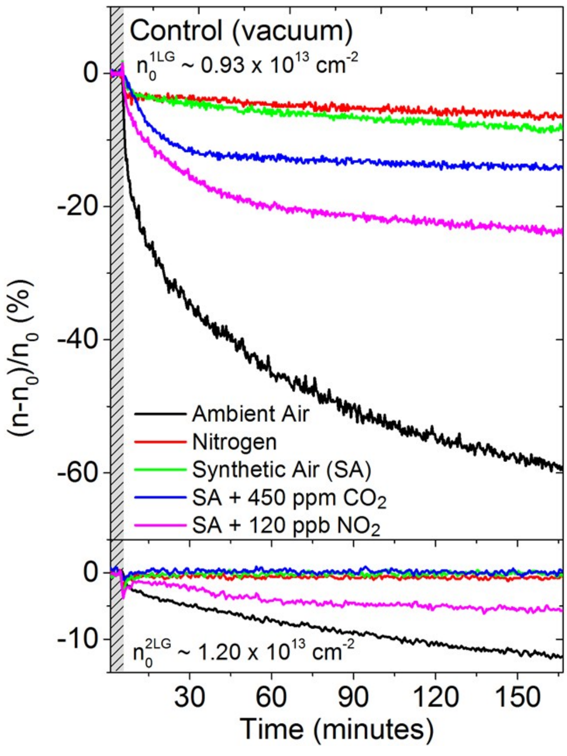

Figure S1: Carrier concentration of epitaxial graphene on SiC(0001) (top 1LG and bottom 2LG) under exposure to different atmospheric contaminants: (black) ambient, (red) nitrogen, (green) synthetic air (SA), (blue) SA + 450 ppm CO_2 and (pink) SA + 120 ppb NO_2.