Title: Carrier mobility and scattering lifetime in electric double-layer gated few-layer graphene

Author: E. Piatti S. Galasso M. Tortello J.R. Nair C. Gerbaldi M. Bruna S. Borini D. Daghero R.S. Gonnelli

PII: S0169-4332(16)31421-0
DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2016.06.192
Reference: APSUSC 33562

To appear in: *APSUSC*

Received date: 25-2-2016
Revised date: 28-6-2016
Accepted date: 29-6-2016

Please cite this article as: E. Piatti, S. Galasso, M. Tortello, J.R. Nair, C. Gerbaldi, M. Bruna, S. Borini, D. Daghero, R.S. Gonnelli, Carrier mobility and scattering lifetime in electric double-layer gated few-layer graphene, *<![CDATA[Applied Surface Science]]>* (2016), http://dx.doi.org/10.1016/j.apsusc.2016.06.192

Highlights

- Few-layer graphene FETs have been fabricated by mechanical exfoliation, photolithography, metal evaporation and lift-off.
- A Li-TFSI based polymer electrolyte solution (PES) has been employed to induce carrier densities as high as ≈ 6e14 e^-/cm^2 in the device's channel.
- The dependences of the sheet conductance and the mobility on the carrier density have been explored both at room temperature and below the PES glass transition.
- A strong asymmetry in these quantities has been found between electron and hole doping.
- A combination of experimental results and ab-initio DFT calculations has been used to obtain the average scattering lifetime of the charge carriers.
- Two competing effects are found to determine the scattering lifetime: the increase in the carrier density and an unexpected increase in the density of surface charged scattering centers.