**Disorder and Screening in Decoupled Graphene on a Metallic Substrate**

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Abstract

We report the coexistence of charge puddles and topographic ripples in graphene decoupled from the Ir(111) substrate it was grown on. We show the topographic and the charge disorder to be locally correlated as a result of the intercalation of molecular species. These result in an overall positive doping of the graphene. The doping gradually decreases and becomes non-existent on graphene wrinkles where the graphene surface is far away from the influence of the substrate.

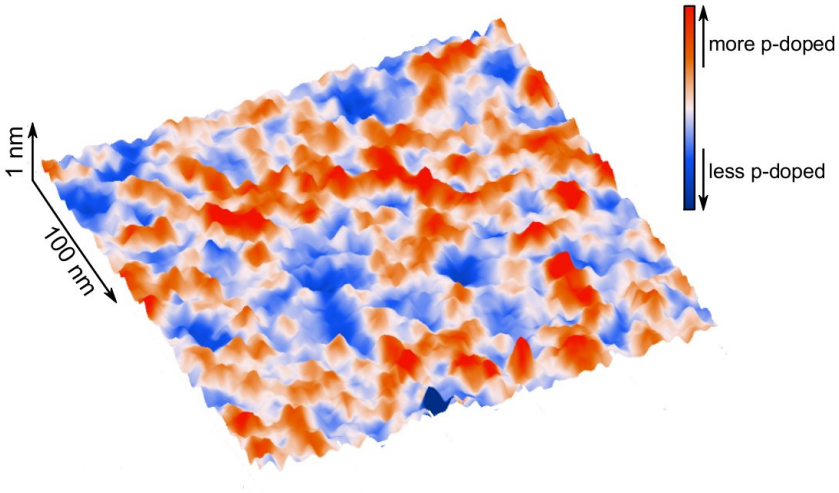
From the analysis of quasi-particle scattering interferences, we find a linear dispersion relation, demonstrating that graphene on a metal can recover its intrinsic electronic properties. The measured Fermi velocity $v_F$ = (0.9 ± 0.04) x $10^6$ m/s is lower than in graphene on dielectric substrates, pointing to a strong screening of electron-electron interactions in graphene by the nearby metallic substrate.

References

[1] S. C. Martin, S. Samaddar, B. Sacépé, A. Kimouche, J. Coraux, F. Fuchs, B. Grévin, H. Courtois and C. B. Winkelmann, arXiv:1304.1183, accepted in *PRB Rapid Comm.*

[2] A. Kimouche, O. Renault, S. Samaddar, C. B. Winkelmann, H. Courtois, O. Fruchart and J. Coraux, *Carbon* **68**, 73 (2014).

Figures




Topography positively correlated with Doping. Dirac point map (color code) superimposed with a 3D plot of the long-wavelength topography. Image of 250 x 250 $nm^2$.