Growth of Single-Layer Graphene on Single Crystal Pt(111) Substrate

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Abstract

Epitaxial growth of graphene on transition metal substrates have been evidenced as an effective way for graphene synthesis. Furthermore, graphene growth on Pt(111) substrate is attractive because of the weak bonding interaction with the substrate[1-3], which will affect the structure and electronic properties of the graphene. In our work we successfully fabricated single-layer graphene on metal substrates by surface segregation and chemical vapor deposition, respectively. The graphene were investigated by spatially resolved scanning Auger microscope, atomic force microscopy and scanning tunneling microscopy, as shown in Fig. 1 (a) and (b). By surface segregation technique, we can produce large-area, single-layer graphene islands more than microns from carbon-doped Pt(111) substrate. By chemical vapor deposition technique, we can produce uniform single-layer graphene islands with several microns up to wafer-scale single-layer graphene, which will be an ideal system to study the electronic properties and interaction between graphene and the substrate.

References

[1] P. Sutter, J. T. Sadowski, and E. Sutter, Phys. Rev. B 80, 245411 (2009).

[2] N. Levy, S. A. Burke, K. L. Meaker, M. Panlasigui, A. Zettl, F. Guinea, A. H. Castro Neto, M. F. Crommie, Science **329**, 544 (2010).

[3] M. M. Ugeda,D. Fernández-Torre, I. Brihuega, P. Pou, A. J. Martínez-Galera, Rubén Pérez, and J. M. Gómez-Rodríguez, Phys. Rev. Lett. 107, 116803 (2011).

[4] L. B.Gao, W. C. Ren, H. L. Xu, L. Jin, Z. X. Wang, T. Ma, L. P. Ma, Z. Y. Zhang, Q. Fu, L. M. Peng, X. H. Bao, H. M. Cheng, Nat. Commun. **3**, 699 (2012).

Figures

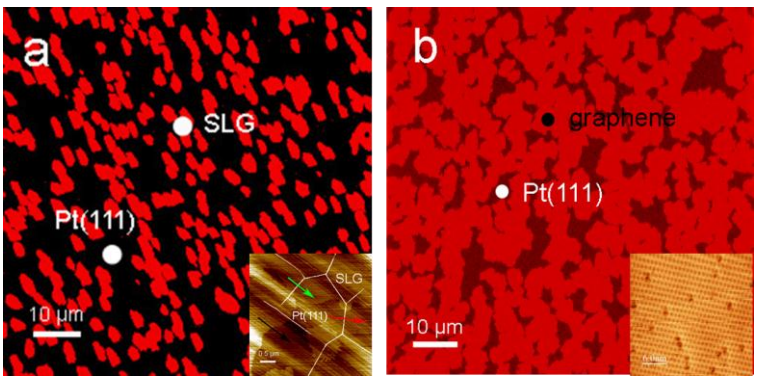

Fig. 1 Scanning Auger map C_{KLL} image of monolayer graphene/Pt(111) by surface segregation (a) and chemical vapor deposition (b) technique. The inset are atomic force microscopy and scanning tunneling microscopy image.