

Influence of substrate temperature and SiC buffer layer on the quality of graphene formation directly on Si(111)

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Abstract:

Evidence for the epitaxial growth of graphene films directly on Si(111) 7×7 surface reconstruction was demonstrated (Fig. 1), however the production of low surface roughness and large area graphene on Si wafer is still a challenge in the context of direct deposition of carbon atoms using an electron beam evaporator [1, 2]. Therefore, in order to optimize this film for approaching industrial applications, in this paper we continue investigating the structural and electronic properties of our material at various substrate temperatures using covered SiC buffer layers with different thicknesses under appropriate preparation by Auger electron spectroscopy, X-ray photoemission spectroscopy, Raman spectroscopy, scanning electron microscopy and scanning tunneling microscopy. Recorded experimental results confirm this significant influence on the quality of graphene formation. This method might be very promising for graphene-based electronics and its integration into the silicon technology.

References:

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- [2] Pham Thanh Trung, Jessica Campos-Delgado, Frédéric Joucken, Jean-François Colomer, Benoit Hackens, Jean-Pierre Raskin, Cristiane N. Santos, and Sporken Robert, J. Appl. Phys. 115, 223704 (2014);

Figure:

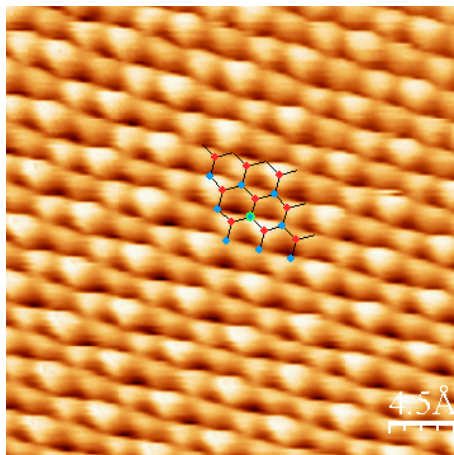


Fig. 1: An atomic resolution STM image of $30\times 30\text{Å}^2$ ($V_{\text{Sample}} = -0.12\text{V}$, $I_{\text{T}} = 10\text{nA}$) from graphene films on Si(111) 7×7 surface reconstruction showing the AB (Bernal) stacking order of a typical graphene lattice [2].