Direct growth of nanocrystalline graphene films on Si(111)

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Abstract:

Graphene has attracted considerable attention due to its excellent physical and chemical properties during the past ten years [1-2]. It opens new possibilities not only for fundamental physics research but also for industrial applications. Since silicon plays an indispensable role in the field of electronic devices, the solution for graphene growth on Si wafer becomes an essential topic [3-6]. A designed combination between graphene and silicon would overcome the traditional limitations that silicon is facing, which impedes further scaling down of devices. Therefore, in this poster, we report the direct growth of nanocrystalline graphene films on Si(111) wafer under appropriate conditions using an electron beam evaporator. The structural quality of the material is investigated in detail by Reflection high energy electron diffraction (RHEED), Auger electron spectroscopy (AES), X-ray photoemission spectroscopy (XPS), Raman spectroscopy. In particular, we present high resolution scanning electron microscopy (HR-SEM) and scanning tunneling microscopy (STM) images which establish unambugiously the nature of such films. Our experimental results confirm that the quality of graphene films is strongly dependent on the growth time during carbon atoms deposition.

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Figures:

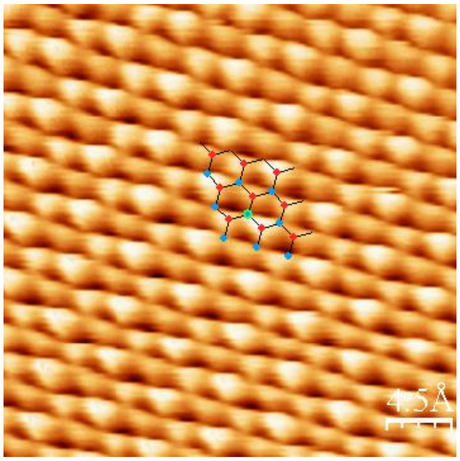

Figure 1: Atomic resolution STM image of graphene films on Si(111) of 30×30$Å^2$ (V_{Sample} = -0.12V, I_T = 10nA).