Growth of graphene on Ge (100) from carbon solid source

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Graphene (GR), a single layer of sp^2-bonded carbon atoms arranged in a honeycomb lattice, has attracted a significant scientific and technological interest due to its remarkable electrical properties. For microelectronic applications, a key issue is to integrate GR into Si technology. In recent years many approaches have been explored to synthesize GR on a foreign substrate and transfer it on Si. So far, and despite some interesting results with such approaches, integration on microelectronics substrates can only be achieved by direct growth. However, GR cannot be grown directly on Si substrate because of the strong Si-C bonds that prohibit the formation of free-standing GR. Monocrystal Ge substrates could be a good alternative to have GR directly on the substrate of interest, since ,Ge Ge doesn't form stable carbides due to the extremely low solubility of carbon. Ge is also considered as a promising material to replace conventional silicon in next-generation high-performance metal-oxide-semiconductor field-effect transistors (MOSFETs) due to its higher carrier mobility and good process compatibility with Si-based microelectronic processes [1-3]. .

However, the growth of GR on Ge still represents a challenge for many factors. In particular, the surface preparation of Ge substrate before the growth [4] and Ge temperature during graphene deposition are revealed to be extremely important [5-11].

In our study we have investigated the molecular beam epitaxy (MBE) growth of GR on Ge(100) using a carbon solid source.

First, we have optimized the surface preparation of Ge substrate, then we have studied the optimal temperature with the aim to growth a uniform and continuous monolayer of graphene.

Thus, we present the first promising results of the presence of GR on Ge by TEM, Raman and XPS spectroscopies.

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