Growth of graphene on semiconductor
:from single-crystal to amorphous

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The graphene has been intensively studied since 2004 because of its incredible and unique physical, chemical, and electrical properties. A promising graphene-based application is the complementary integration of graphene with current mainstream Si-based complementary metal oxide semiconductor (CMOS) technology, yielding improved performance of semiconductor-based devices. However, transition metal catalysts such as Cu and Ni, commonly used for chemical vapor deposition (CVD) growth of graphene, could induce vital problems in device operation. Also, metal-assisted growth requires an additional transfer process, which results in unwanted metal contaminations. As a possible solution, the direct growth of graphene on a semiconductor substrate has been suggested. In this seminar, I will introduce our current progress of the direct growth of graphene on germanium (Ge) surface. By using the Ge’s catalytic activity for the formation of graphitic carbon and the extremely low solubility of carbon in Ge, we demonstrated the growth of monolayer graphene on a semiconductor Ge surface. Furthermore, we successfully controlled crystalline of monolayer graphene on Ge from single crystal to amorphous. We believe that our proposed growth approach provides an important point of future semiconductor/graphene hybrid and nanoelectronic devices applications.