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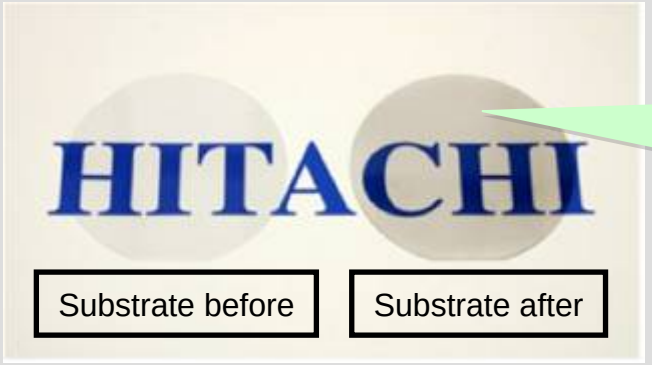
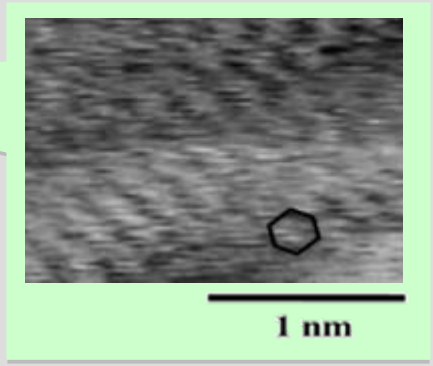
Fabrication technology of Graphene that has ten times faster electron mobility than silicon on sapphire substrate

Contribution to mass-production processes of high-speed electronic devices



Graphene on 2-inch sapphire substrate

Scanning tunneling microscopy image of graphene



Hitachi, Ltd. has developed a technology to fabricate graphene on sapphire substrates. Graphene has electron mobility ten times faster than that of the silicon used in various electronic devices. It is arranged in a honeycomb structure of a 0.34 nm thick atomic monolayer sheet (1nm is 1 millionth mm). It is expected to be applied to high-speed electronic devices used in network equipment of communication base stations. Graphene has been fabricated on the silicon and silicon substrate by an experimental technique. However, the technology has not yet been developed that can fabricate graphene on the insulator sapphire substrates that is suitable for electronic devices. Applying a vapor-phase epitaxial method suitable for mass-producing graphene enables the number of layers on the insulator sapphire substrate to be controlled and the number of layers to be easily measured by light transmission. Using this technology enables mass-production of graphene on the sapphire substrate and high-speed electronic devices that utilize the feature of graphene.

Tohoku University President Akihisa Inoue and Professor Takashi Kyotani of Institute of Multidisciplinary Research for Advanced Materials co-developed this technology.