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Novel epitaxy of graphene using substrate microfabrication HIROKAZU FUKIDOME, MASATO KOTSUGI, TAKUO OHKOUCHI, TOYOHIKO KINOSHITA, THOMAS SEYLLER, KARSTEN HORN, YUSUKE KAWAI, MAKI SUEMITSU, YOSHIO WATANABE — Epitaxy of graphene on SiC is promising for device applications owing to the capability to produce large-area film. For the further applications toward integrated devices, the microscopic thickness variation of graphene should be minimized because the thickness of graphene critically determines the electronic properties, such as carrier mobility and bandgap. One of the effective solutions is the epitaxy on microfabricated substrates to spatially control surface reactions involved in the epitaxy. The controllability of the epitaxy using substrate microfabrication has been already proven for the homoepitaxy on microfabricated Si substrates. We therefore study heteroepitaxy of graphene on microfabricated 6H-SiC(0001) substrates as a model system to produce epitaxial graphene without thickness variation. It has been in fact demonstrated by using photoemission and low energy electron microscopies that the epitaxial graphene exhibits no thickness variation when the size of microfabrication pattern is small (below 10 micrometer). Further the shape of the microfabrication pattern is also influential to the microscopic variation of the graphene. The controlled epitaxy of graphene by substrate microfabrication is thus demonstrated to be vital for future integrated graphene devices.

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