Electrical Homogeneity Mapping of Epitaxial Graphene on Silicon Carbide - DTU Orbit

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Epitaxial graphene is a promising route to wafer scale production of electronic graphene devices. Chemical vapor deposition of graphene on silicon carbide offers epitaxial growth with layer control, but is subject to significant spatial and wafer-to-wafer variability. We use terahertz time-domain spectroscopy and micro four-point probes to analyze the spatial variations of quasi-free-standing bi-layer graphene grown on 4 inch silicon carbide (SiC) wafers, and find significant variations in electrical properties across large regions, which are even reproduced across graphene on different SiC wafers cut from the same ingot. The DC sheet conductivity of epitaxial graphene was found to vary more than one order of magnitude across a 4 inch SiC wafer. To determine the origin of the variations, we compare different optical and scanning probe microscopies with the electrical measurements from nano- to millimeter scale and identify three distinct qualities of graphene, which can be attributed to the microstructure of the SiC surface.

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