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Si on epitaxial graphene on SiC: intercalation and graphene-SiC transformation[1] FENG WANG, KRISTIN SHEPPERD, Georgia Institute of Technology, ALEXEI ZAKHAROV, MAX-lab, EDWARD CONRAD, Georgia Institute of Technology — The interface between epitaxial graphene and bulk SiC plays a dominant role in both the growth and transport properties of graphene on SiC. The differences in diffusion of Si through graphene on the two polar SiC surfaces is related to the different nucleation of Si diffusion channels on the two graphene-SiC interfaces. In this work we use LEEM, XPEEM and XPS to study how the excess Si at the graphene-vacuum interface reorders itself at high temperatures. We show that silicon deposited at room temperature onto multilayer graphene films grown on the SiC$(000\bar{1})$ surface rapidly diffuses to the graphene-SiC interface when heated to temperatures above 1020 °C. The Si that does intercalate into the interface can be removed back out to the graphene-vacuum boundary by heating the sample to 1200 °C. Most of the Si evaporates at this temperature, however, a significant amount of Si reacts with the graphene at the vacuum interface and form a relative stable reconstructed (2×2) SiC structure. At significantly higher Si concentrations, graphene at the vacuum interface transforms to SiC.

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