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Unexpected Structures for Intercalation of Sodium in Epitaxial SiC-Graphene Interfaces[1] ANDREAS SANDIN, North Carolina State University, THUSHARI JAYASEKERA, Southern Illinois University-Carbondale, J. E. (JACK) ROWE, KI-WOOK K, MARCO BUONGIORNO-NARDELLI, DANIEL B. DOUGHERTY, North Carolina State University — We show using scanning tunneling microscopy and spectroscopy and calculations from first principles that several different intercalation structures exist for Na in epitaxial graphene on SiC(0001). Intercalation takes place rapidly at room temperature and tunneling spectroscopy shows that it significantly electron dopes the graphene. Upon annealing above room temperature a quite different intercalation structure is formed which removes the carbon-rich interface layer and transforms this into a second graphene layer. In addition, we find that direct deposition of Na onto the carbon rich buffer layer graphene precursor decouples it from the SiC substrate leading to formation of a new sheet of graphene. This interface-layer decoupling is unambiguously demonstrated by transforming bare buffer layer to a graphene layer. Our observations show that intercalation in graphene is fundamentally different than in graphite and provides a very versatile approach to metal-graphene functionality and electronic-property control.

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