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Selective Epitaxial Graphene Growth on SiC via AlN Capping FARHANA ZAMAN, MIGUEL RUBIO-ROY, MICHAEL MOSELEY, JONATHAN LOWDER, WILLIAM DOOLITTLE, CLAIRE BERGER, RUI DONG, JAMES MEINDL, WALT DE HEER, Georgia Institute of Technology, GEORGIA INSTITUTE OF TECHNOLOGY TEAM — Electronic-quality graphene is epitaxially grown by graphitization of carbon-face silicon carbide (SiC) by the sublimation of silicon atoms from selected regions uncapped by aluminum nitride (AlN). AlN (deposited by molecular beam epitaxy) withstands high graphitization temperatures of 1420^{o}C, hence acting as an effective capping layer preventing the growth of graphene under it. The AlN is patterned and etched to open up windows onto the SiC surface for subsequent graphitization. Such selective epitaxial growth leads to the formation of high-quality graphene in desired patterns without the need for etching and lithographic patterning of graphene itself. No detrimental contact of the graphene with external chemicals occurs throughout the fabrication-process. The impact of process-conditions on the mobility of graphene is investigated. Graphene hall-bars were fabricated and characterized by scanning Raman spectroscopy, ellipsometry, and transport measurements. This controlled growth of graphene in selected regions represents a viable approach to fabrication of high-mobility graphene as the channel material for fast-switching field-effect transistors.

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