Selective Epitaxial Graphene Growth on SiC via AlN Capping

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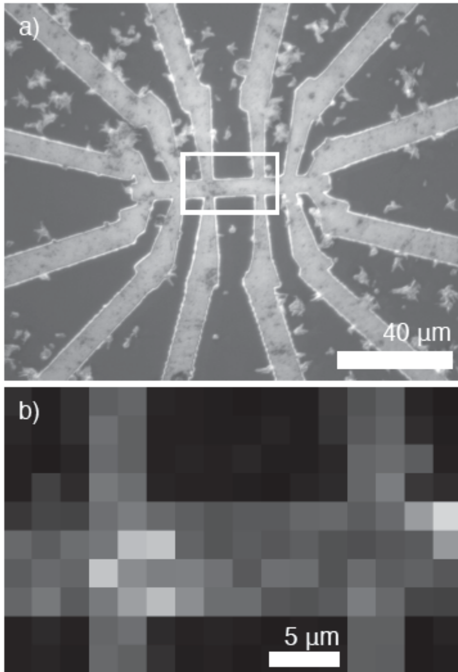


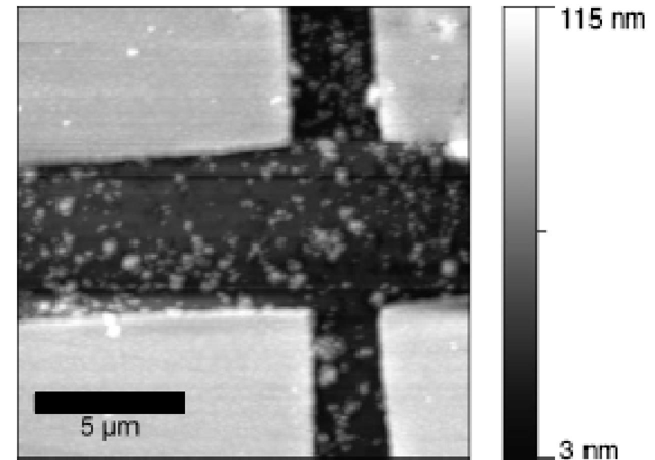
a) Optical microscope image of graphene hall-bar with square delimiting scanned area. b) 2D band intensity of scanned area. Characteristic Raman signal for graphene only appears in non-capped areas.

AlN, deposited by molecular beam epitaxy and patterned by electron beam lithography, forms an effective capping layer for epitaxial graphene growth on C-face SiC.

Graphitization in background Ar pressure of 100 Pa at 1420°C eliminates any Si sublimation from regions covered with AlN.

Characterization of Selective Epitaxial Graphene

Thickness: 0.6 nm
Measured sheet resistance: 1.0±0.1 kΩ/□
Electron density: $1.08 \pm 0.06 \times 10^{13}$ cm^{-2}
Hall mobility: 580±80 cm^2/Vs



Noncontact AFM topography image of part of a hall bar: Small AlN residue particles are visible after annealing.

Key Points:

- Successful growth of ***epitaxial graphene in selected regions*** of SiC not capped by AlN
- Growth with ***no exposure of the graphene to external chemicals***, such as resists and etchants, that deteriorate graphene performance

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