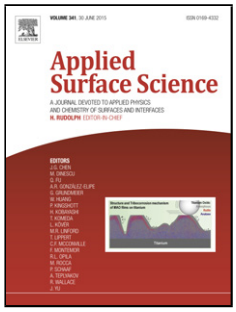

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Author: Subrata Ghosh K. Ganesan S.R. Polaki Tom Mathews Sandip Dhara M. Kamruddin A.K. Tyagi

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Influence of substrate on nucleation and growth of vertical graphene nanosheets

Subrata Ghosh†, K. Ganesan†, S. R. Polaki, Tom Mathews, Sandip Dhara, M. Kamruddin and A. K. Tyagi

Surface and Nanoscience Division, Indira Gandhi Centre for Atomic Research, Kalpakkam 603102, India.

Corresponding authors

†E-mail : subrataghosh.phys@gmail.com (Subrata Ghosh)

†E-mail : kganesan@igcar.gov.in (K. Ganesan)

- Substrate dependent growth of vertical graphene nanosheets (VGNs) is studied under ECR-CVD.
- Substrate properties like surface energy and thermal conductivity plays the major role in differential growth of VGNs.
- Formation of *a*-C and pentagon-heptagon structure at early stage nucleation dictates the morphology and structural quality.
- A phenomenological model is demonstrated to understand substrate dependent growth.

Abstract

The present study reports the role of substrate on nucleation and growth of vertical graphene nanosheets (VGNs) under electron cyclotron resonance chemical vapor deposition (ECR-CVD). The VGNs are grown on Pt, Ni, Au, Cu, Si(100), Si(111), SiO_2 and quartz substrates simultaneously. The morphology of VGNs is found to vary significantly with substrate. VGNs on Pt have the highest aerial density of vertical sheets while quartz have the lowest. The structural defects in VGNs vary with substrate as evidenced from Raman spectroscopy. The observation of defect related Raman bands such as D″ and D* at 1150 and 1500 cm^{-1},