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Direct Graphene Growth on Insulator by MBE

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Graphene, an outstanding material with two-dimensional structure and zero band gap, is in focus of intensive efforts to revolutionise high-frequency microelectronic applications.

Conception and realization of graphene based devices are often hindered by the fact, that layer growth method does not meet the limitation of the device fabrication in silicon mainstream technology like temperature budget or defect and impurity density in the process.

A step to overcome these limitations might be the direct growth of graphene on materials with insulating nature by molecular beam epitaxy (MBE). In our presentation we demonstrate graphene growth on insulating silicate substrate with high electronic band gap by solid-phase epitaxy in UHV. Graphene film evaluation is performed with Raman microspectroscopy, XPS, and AFM. The quality of the graphene was probed by high-resolution Raman. The distortion derived D-mode and the graphene associated G and 2D emissions and indicates a single layer graphene with low density of defects and promise high charge carrier mobility.

Graphene growth on the silicate substrate was simulated by DFT calculations within the LDA approximation.