Facile preparation of Au(111)/MICA substrates for high-quality graphene nanoribbon synthesis

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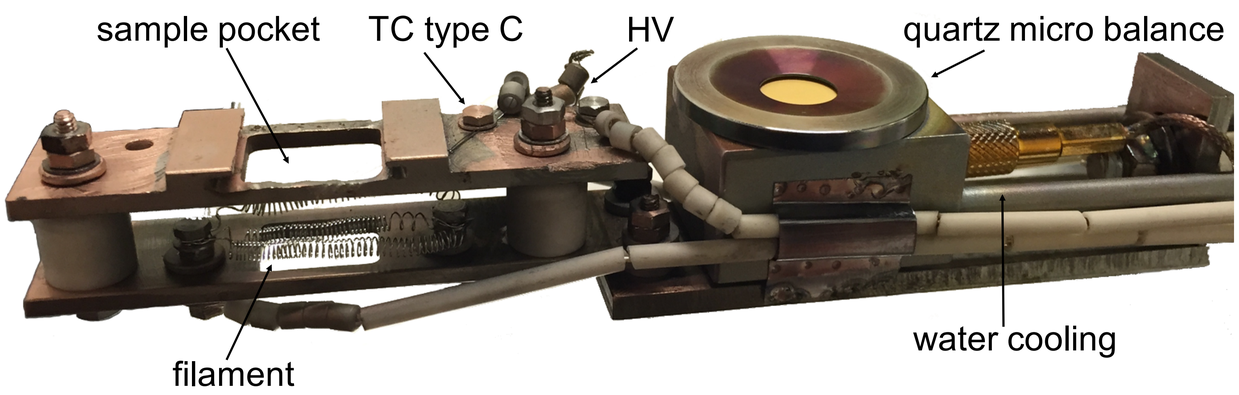
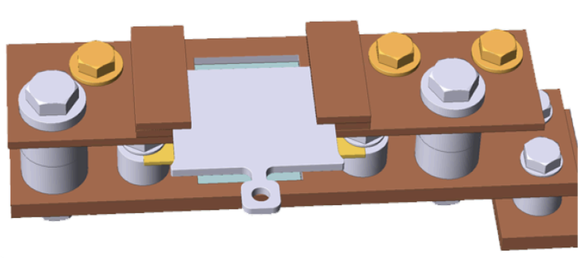
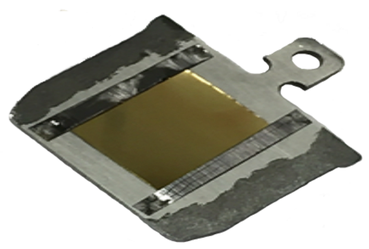
Motivation The present work establishes the in-situ preparation of Au(111)/MICA as an inexpensive and simple method to prepare substrates of desired shape and thickness for surface polymerization reactions which are of interest to a growing community of researchers working on graphene nanoribbons.

Setup



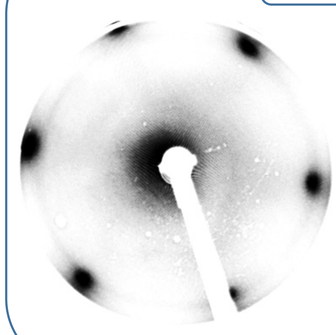


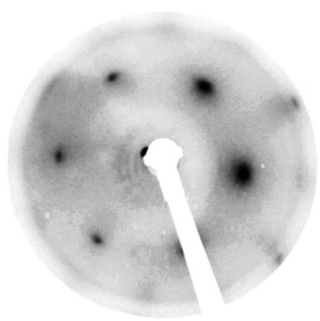


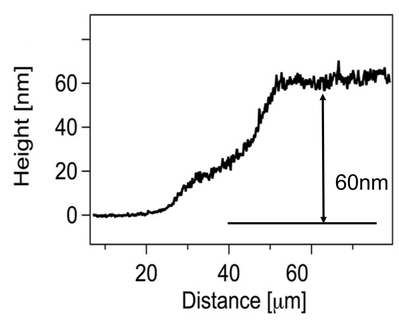
Sample preperation

- Degasing of freshly cleaved MICA sheet in UHV (<10^{-5} mbar) at 300°C
- Deposition of Au with a minimum rate of 0.5 Å/s
- Annealing at 600°C to get Au(111) structure

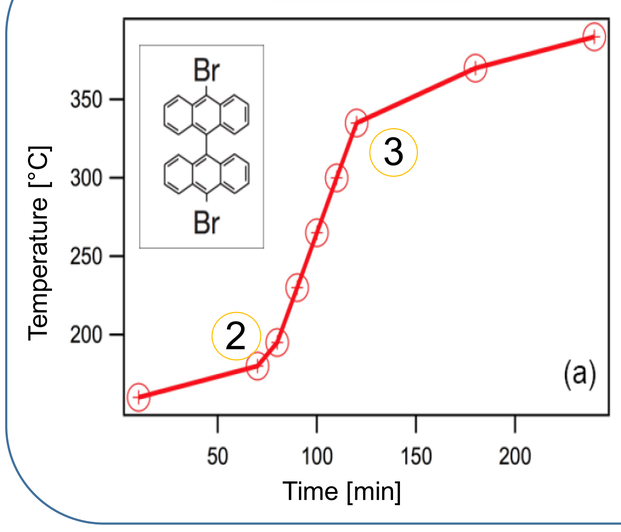
LEED and AFM





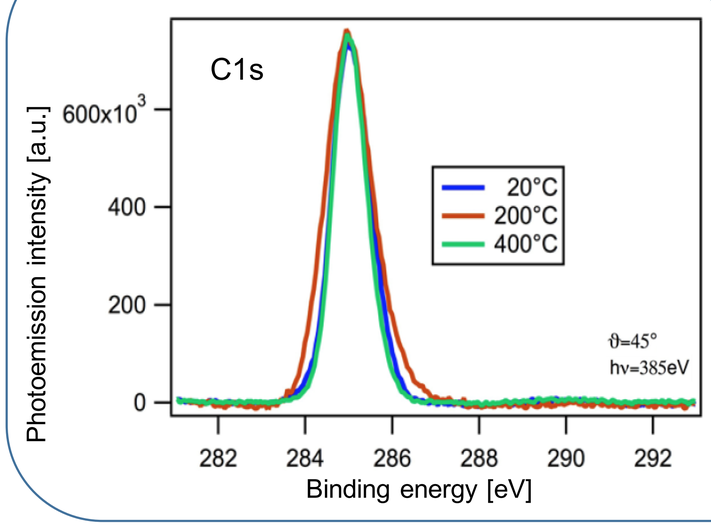


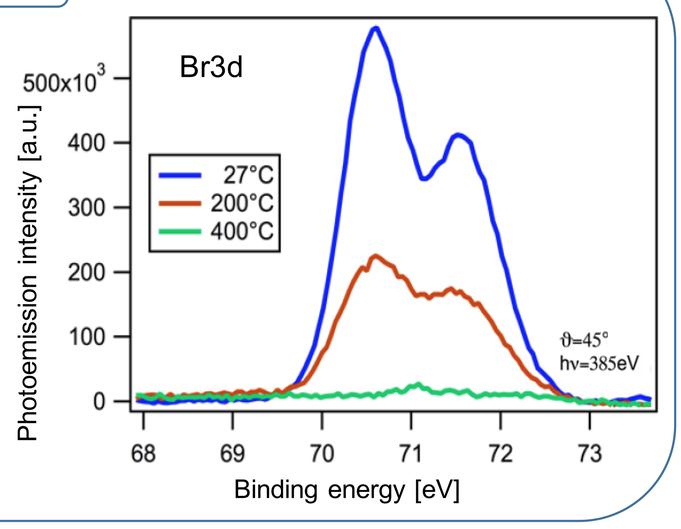
Synthesis



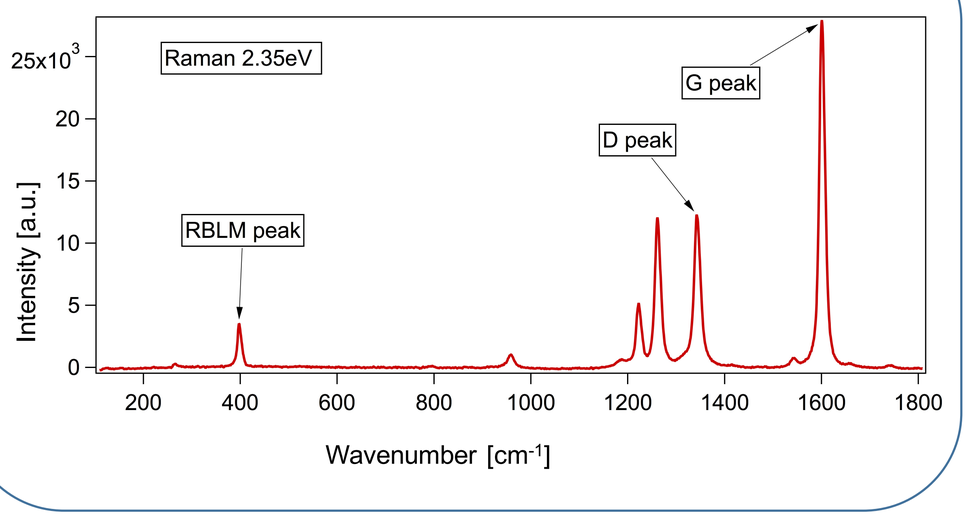
(1) Deposition of molecular precusor (DBBA)
(2) Debromization at 200°C
(3) Cyclodehydro-genation at 400°C

XPS

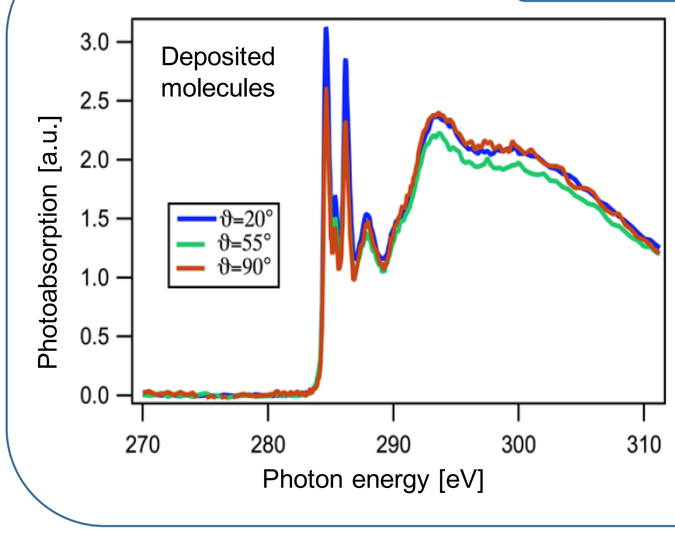


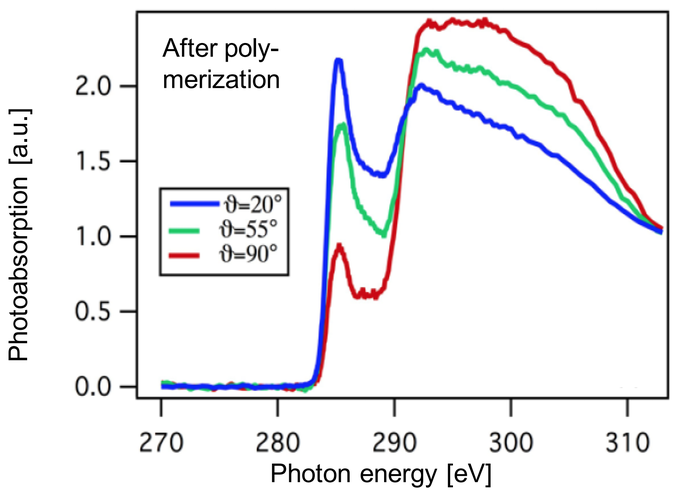


RAMAN



NEXAFS C-K-edge





Summary We show an inexpensive and simple method to prepare high quality disposable Au(111)/MICA substrates for the surface polymerization of graphene nanoribbons using a molecular precusor. The spectroscopic investigation of GNR samples grown on this substrate indicates that the GNRs have spectra identical to those obtained from single crystal substrates. This has been checked using Raman spectroscopy, XPS and NEXAFS. The method introduced here is important for the growing GNRs community which wishes to synthesize GNRs on purpose made substrates.

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