Graphene Fabrication

Beamline: U7A

Category of Researcher:
NIST PRT

Technique:
NEXAFS Spectroscopy

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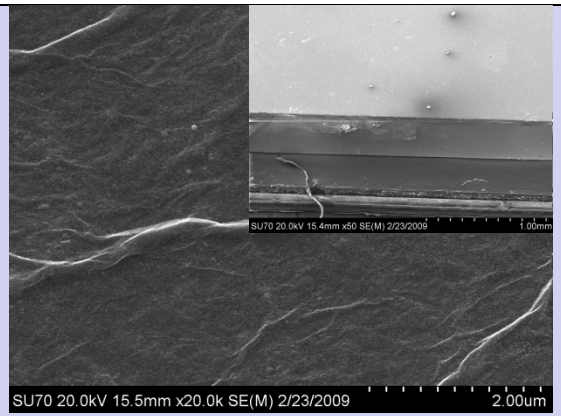
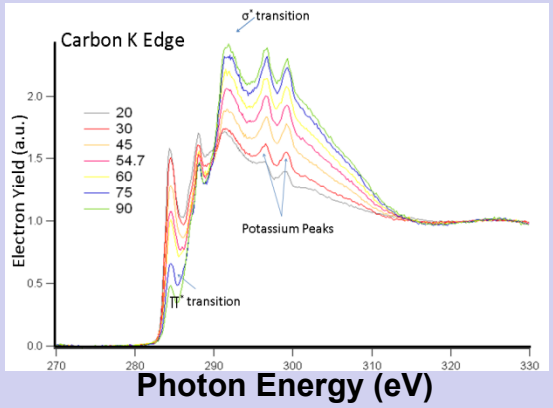
Motivation:

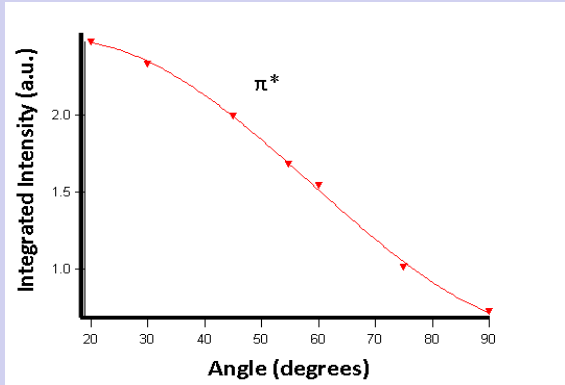
Graphene is attracting tremendous interest for device applications because of its extremely high mobilities, tunable band gap, and the possibility of quantum electronic transport. The fabrication of large-area graphene films remains a challenge. We use chemical exfoliation and electrophoretic deposition to fabricate uniform and flat graphene films over large area substrates.

Results:

NEXAFS spectroscopy enables simultaneous measurement of chemical functionalization, defect density, and degree of alignment of the graphene films. NEXAFS measurements can be used to follow the distortion and puckering of graphene films upon chemical functionalization. Angle-dependent NEXAFS shows that large-area graphene samples can be fabricated with a high degree of alignment by combining chemical exfoliation and reduction with electrophoretic deposition.







SEM images of large-area graphene films (top), C K-edge NEXAFS spectra collected at different angles (middle), and plot of integrated intensity of the C K-edge π peak as a function of the incident angle*