

Characterization and preparation of graphene and graphene based nanostructures by scanning probe methods

Peter NEMES – INCZE

Researcher

Research Centre for Natural Sciences
Institute for Technical Physics and Materials Science,
Korean-Hungarian Joint Laboratory for Nanosciences
www.nanotechnology.hu

The excellent electrical properties of graphene (very high electron mobility, long coherence length of charge carriers, etc.) has brought this exiting 2D crystal into the spotlight of nanomaterials research. Graphene may well turn out to be a key material in shaping post silicon nanoelectronics. However, for the large scale implementation of graphene based electronics two major obstacles have to be overcome: preparing defect free graphene layers on a large scale and modifying its properties in order to realize the desired component functionality. We have used scanning tunneling microscopy (STM) and atomic force microscopy to characterize graphene at the nanoscale and reveal the defect structure of graphene grown by chemical vapor deposition¹⁻³. Furthermore we have used STM lithography⁴ and AFM indentation combined with carbothermal etching⁵ to modify the properties of graphene sheets by preparing nanoribbons, demonstrating the highest resolution lithography to date.

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