CVD Graphene Electrical Quantum Metrology

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Abstract

Graphene, a two dimensional material with sp^2 hybridized carbon atoms arranged in honey comb lattice, is known for its unique electronic and mechanical properties [1]. Quantum Hall Effect (QHE) in graphene is of particular interest for metrology. Due to its relatively large spacing between Landau levels in comparison to other 2DEGs; it is possible to observe QHE at lower magnetic fields and higher temperatures than in conventional two-dimensional electron gases (2DEGs). This makes graphene an ideal material to define a quantum resistance standard in terms of electron charge and Planck's constant [2]. QHE in graphene is so robust that it has been observed at room temperature (RT) [3]. We will present results for graphene grown via Chemical Vapor Deposition (CVD) and transferred to SiO_2/Si using different techniques. The transferred graphene films were patterned into millimeter scale Hall bar geometry and characterized using confocal Raman spectroscopy. Room and low temperature electrical transport measurements will be presented [4].

References

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[3] K. S. Novoselov et. al, “Room-Temperature Quantum Hall Effect in Graphene,” Science, vol. 315, March, p. 1379, 2007.
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Figures

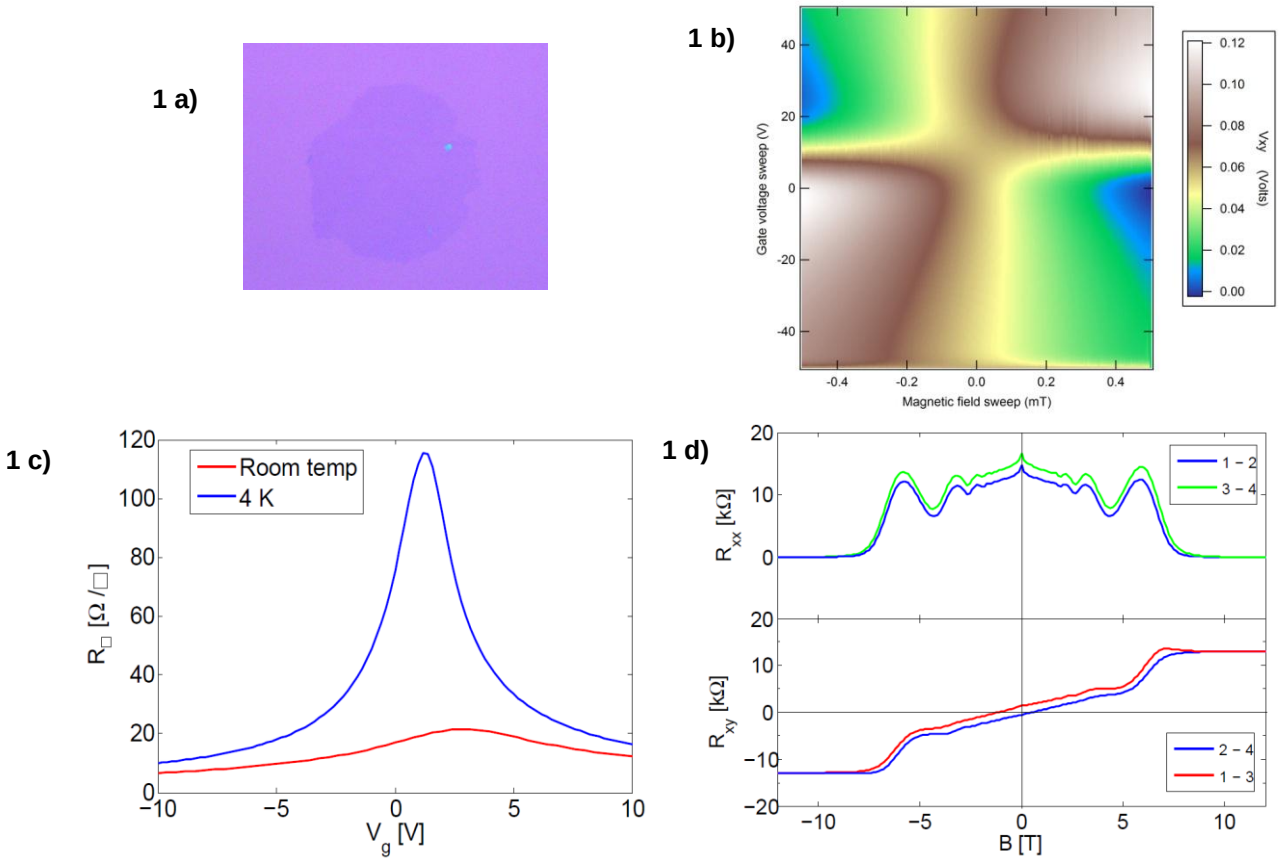

Figure **1 a)** Optical image of CVD graphene on SI/SiO_2 substrate. **1 b)** Hall Voltage vs Magnetic & Gate Voltage sweep (RT). **1 c)** Resistance vs Gate Voltage plot of a typical sample. **1 d)** R_{xx} and R_{xy} vs Magnetic field sweep of a typical CVD graphene sample