

Controlled deposition of few layer graphene and graphene oxide films

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The few layer graphene (FLG) flakes and graphene oxide (GO) flakes were fabricated using liquid phase exfoliation[1] of expanded graphite and oxidized expanded graphite, respectively. Ultrasonic agitation followed by multistep centrifugation offers FLG and GO flakes with a low thickness dispersion suitable for further deposition onto solid substrates in a form of thin film. The modified Langmuir-Schaefer deposition[2] enables us fabrication of high quality thin films transferred on a substrate at the thermodynamic equilibrium conditions which is in contrast to highly non-equilibrium deposition techniques including spin casting or doctor blading. The Fig. 1 shows the four typical phases of FLG film on the water subphase at different surface pressures. The optical images clearly show the transition from isolated FLG islands (1) through percolated FLG network (2) into a closed FLG monolayer (3) followed by a collapse of FLG monolayer at high pressure (4). The FLG and GO thin films were deposited onto silicon substrates and studied using X-ray diffraction, AFM, confocal Raman microscopy (CRM), imaging ellipsometry, optical spectroscopy and sheet resistance measurements. We have developed a calibration free CRM technique[3] for the determination of GO flakes thickness. The herein demonstrated thin FLG and GO films can be used as insertion layers facilitating high conductivity and tunnelling of charge carriers, respectively.

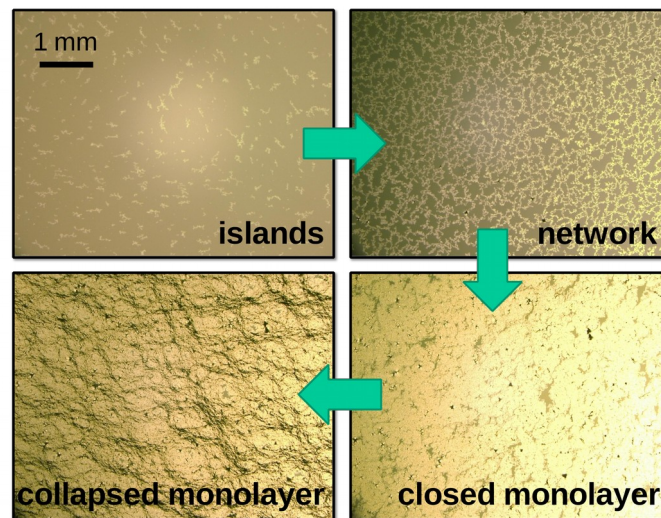


Figure 1: The four typical phases of FLG flakes on water subphase.

Acknowledgements

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References

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