Fragmented graphene on dielectric substrate for THz applications

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Fragmented multi-layered graphene films were directly synthesized via chemical vapor deposition (CVD) on dielectric substrates with pre-deposited copper catalyst. We demonstrated that the thickness of the sacrificial copper film, process temperature and growth time essentially influence the integrity, quality, and disorder of the synthesized graphene.

Atomic Force and Kelvin Probe Force Microscopy measurements revealed the presence of nano-agglomerates and charge puddles. The potential gradients measured over the sample surface confirmed that the deposited graphene film possesses a multilayered structure, which was modelled as an ensemble of randomly oriented conductive prolate ellipsoids (see Fig.1). THz time domain spectroscopy measurements gave ac conductivity of graphene flakes and homogenized graphitic films of around 1200 S/cm and 1000 S/cm (see Fig.2), respectively. Our approach offers a scalable fabrication of the graphene structures composed of graphene flakes and having effective conductivity sufficient for a wide variety of THz applications[1,2].

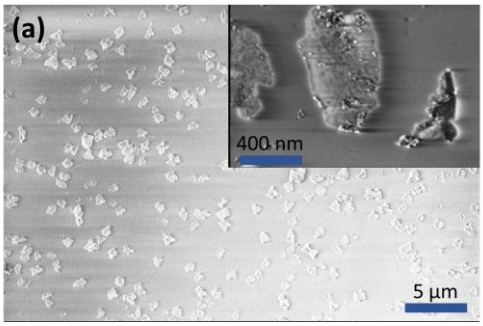

Fig. 1. Top view SEM image of CVD Graphene islands on dielectric.

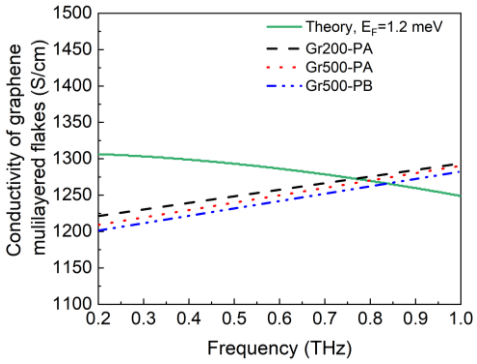

Fig. 2. Calculated conductivity of the graphene flakes and theoretical conductivity obtained by Kubo formulas at chemical potential 1.2 meV.

Acknowledgement

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References

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