Direct Synthesis of Graphene on Glass Using Low Temperature Microwave Plasma Enhanced Chemical Vapor Deposition

Riteshkumar Vishwakarma[1], Zhu Rucheng[1], Amr Abuelwafa[1], Golap Kalita[1,2], Sudip Adhikari[1,3], Masayashi Umeno[2]

[1]C`s Techno Inc., Nagoya Science Park, Nagoya,[2]Nagoya Institute of Technology, [3]Chubu University.

E-mail: nanoritesh@gmail.com, umeno@isc.chubu.ac.jp

With a combination of outstanding properties and wide spectrum of applications, graphene has emerged as a substantial nanomaterial. However, in order to realize its full potential for practical applications, a number of obstacles have to be overcome. The presence of defects, grain boundaries, structural disorders, wrinkles significantly affect electronic and optical properties of graphene. Electronic applications require large graphene samples, which can be provided by chemical vapor deposition (CVD) process at the moment, but it is difficult to produce high quality, single crystal graphene with high electrical and thermal properties with excellent optical transparency. Thermal CVD process is optimum for large area synthesis of graphene. Nevertheless, the transfer process in CVD, may not be suitable for applications using a large substrate, including large-scale integrated (LSI) circuits and large-screen displays. In order to avoid transfer process in CVD, there is need of direct growth of graphene on insulating substrates and also low-temperature growth will be much desired for substrates less tolerant to heat [1, 2]. For this purpose, an attempt has been made to grow large area graphene at 500^{o}C directly on glass using microwave plasma CVD. Fig1 (a) below shows photographic image of glass after deposition indicating a uniform and large area deposition on glass surface. Raman spectrum in fig1 (b) with G and 2D peaks at 1580 cm^{-1} and 2690 cm^{-1} resp. confirms direct graphene growth on glass. Graphene/glass surface has 80% transparency and average sheet resistance 2kΩ.

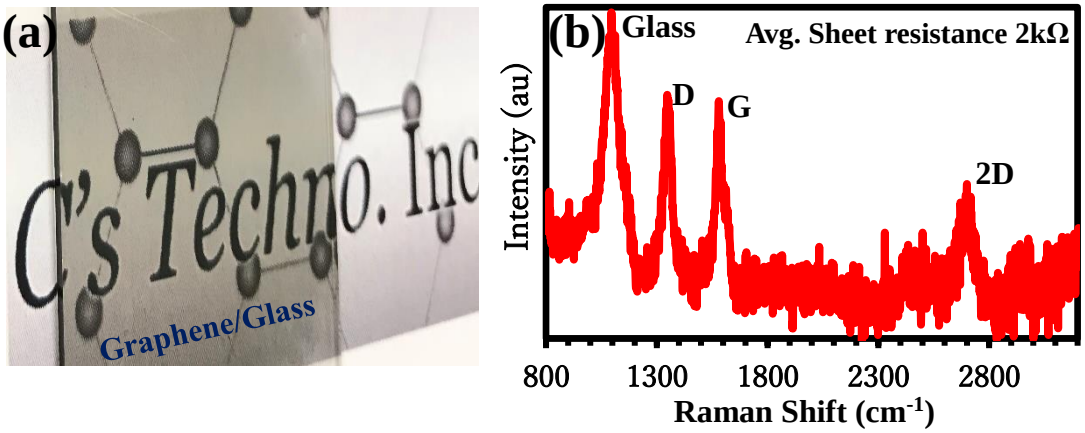

Fig 1 (a) Photographic image of glass after deposition (b) Raman Spectrum of graphene on glass

References

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