

Fabrication of Large Area Graphene Films and Their Applications

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Abstract

Graphene, a single atomic layer of graphite, attracts enormous interest from academia and industry. Because of unique properties such as high mobility of charge carriers, ultra high young's modulus and thermal conductivity, graphene is studied as candidate material for future applications in various fields such as electronics, optoelectronics, composite materials, and thermal management. Among many applications, transparent electrodes for (flexible) display are expected to be near term applications.

Chemical vapor deposition (CVD) has enabled the growth of single layer graphene on copper foil for arbitrary size. However, the practical use of graphene is hampered, since reliable and repeatable production of graphene film with uniform quality is limited. In this presentation, we report rapid thermal chemical vapor deposition (RT-CVD), improved etching and transfer methods, which enabled faster and larger production of homogeneous graphene films over 450 x 350 mm² area. Resulting graphene films on PET have 90% total transmission (including PET) with sheet resistance ~200 Ω/sq. Further efforts are being made to fabricate ultra large size graphene film, which will be as large as 900 x 1600 mm².

In collaboration with application experts, applications using graphene films are fabricated and tested. The effects of graphene films on the performances of applications will be briefly discussed.

References

- [1] J. Ryu, et al., ACS Nano, 8 (2014) 950
- [2] S. Kim, et al., Chemistry of Materials, 26 (2014) 2332

Figures

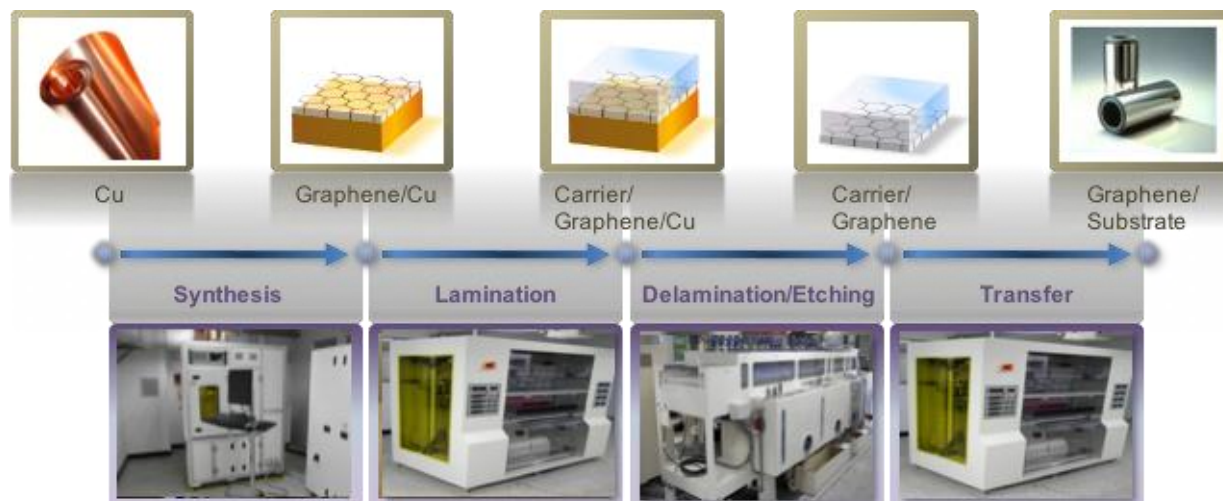


Fig. 1. Processes and Equipment for Manufacturing Large Area Graphene