

Removal of residual PMMA on graphene surface by Infrared irradiation

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Abstract

Large-area graphene was synthesized by chemical vapor deposition (CVD) growth on metal substrates. The graphene has advantages such as extremely high carrier mobility, high thermal conductivity, low resistivity.[1] Typically, poly(methyl methacrylate) (PMMA) is used when graphene transfer to other substrates. The typical transfer process of CVD graphene includes spin coating with PMMA and then etching the copper substrate with copper etchant. After the removal of copper, the PMMA-coated graphene film is placed on the substrate. To remove PMMA on graphene, people used to dip the graphene into the acetone. However, it is known that the remove of PMMA on the graphene is difficult to completely using the acetone. This normally transfer process damages the graphene by inducing ripple and crack formation. Also, the carboxyl functional group in PMMA on graphene surface is the source of p-doping. Therefore, to remove the PMMA on the graphene surface, many research groups have employed various methods such as the thermal treatment, and other solvent.[2,3] Nevertheless, a part of PMMA still remain on graphene surface. Usually, to observe the residual PMMA on graphene surface, topography of graphene surface scanned by atomic force microscopy is used. However, in that case, we can not distinguish PMMA and other particles.

In this study, to confirm the residual PMMA on graphene surface, we employed novel measurement technique which is available to distinguish PMMA and other particles by means of photothermal effect. And we report removal of PMMA on graphene through IR irradiation. To confirm the residual PMMA on graphene surface.

References

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Figure

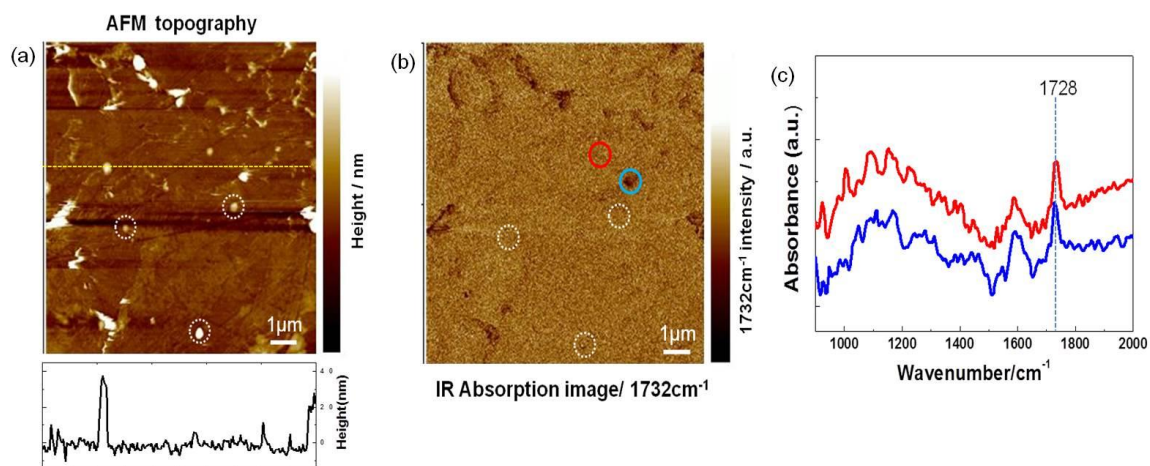


Figure 1. AFM and nano-IR chemical images of residual PMMA on graphene surface.

(a) AFM topography, (b) chemical image at 1732 cm^{-1} (c) nano-IR spectra at selected position (blue, red).