
Grain boundary observation of CVD graphene based on oxygen plasma

Gwan-Hyoung Lee ¹, Jong-Young Lee ¹, and Min Jung Kim ¹

¹Yonsei University, Korea, Republic of

Graphene has received great attention due to its superior physical properties, which make graphene suitable for multiple applications. Among various growth techniques, chemical vapor deposition on catalytic copper films holds great promises for a mass production of graphene. Even though extensive efforts have been devoted to synthesizing high-quality and large-area graphene, formation of defects is not preventable during growth process. The grain boundaries have a dominant effect on its properties, inspiring efforts to modify the CVD growth process to reduce formation of GBs. A transmission electron microscopy is well defined, however, we need to invent easy way to alter TEM due to its complicated sample preparation. Here we report a technique to optically observe GBs in CVD-grown graphene via optical microscopy, allowing rapid assessment of graphene quality. The local oxidation of copper through the damaged GBs induces an optically distinguishable color change in the underlying copper due to different extend of oxidation between the copper regions under grains and GBs. Our observation technique for GBs of graphene paves a path for understanding fundamental mechanisms of graphene growth and efficient quality evaluation of large-scale graphene sheet for mass production. Furthermore, we integrated movable plasma generator and typical CVD system for realizing in-situ process of GB observation or surface treatment technique on as-grown product.