

Cu 基板表面の酸化に伴う CVD 合成されたグラフェン結晶の構造変化
Transformation of CVD synthesized graphene crystals with oxidation of Cu surface

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In the present studies, we revealed the structural transformation process of as-synthesized individual graphene crystals with oxidation of the Cu foil. We found that the transformation of a graphene crystal with Cu oxidation is significantly different for the thermal annealing and room temperature long-term atmospheric oxidation. Annealing created large cracks in an individual graphene crystal due to the thermal stress and strain created by rapid oxidation of Cu surface. The cracks were further enhanced with longer annealing duration enabling oxygen diffusion through cracks, thereby accelerating oxidization of Cu. Eventually, the graphene crystals were completely damaged, leaving behind the highly oxidized Cu surface. On the other hand, in case of room temperature long-term atmospheric oxidation, oxygen diffusion occurred underneath of a graphene crystal through the reactive edge without any large cracks formation. The graphene crystals decoupled from Cu surface during the oxygen diffusion and oxidation process, however no structural deformation was observed. This finding shows the significant contrast of structural change of graphene crystal and oxidation behaviors of Cu surface with thermal annealing and room temperature atmospheric oxidation.

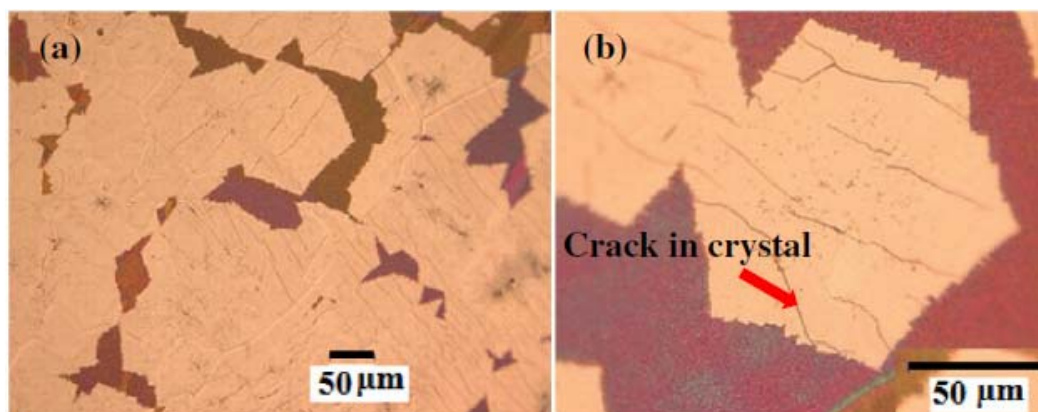


Figure 1 Optical microscope images of graphene crystals synthesized on Cu foil by solid source based CVD process after oxidation of the Cu foil

References

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