

Doping and degradation mechanism of Au complex-doped graphene

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In this study, the role of anions in Au complexes was investigated as a dopant for graphene. Au(OH)₃, Au₂S, AuBr₃, and AuCl₃ were used as dopants. The average sheet resistance of the graphene decreased from 950 Ω/sq to 820, 600, 530, and 300 Ω/sq and work function increased from 4.3 eV to 4.6, 4.8, 5.0 and 4.9 eV with Au(OH)₃, Au₂S, AuBr₃, and AuCl₃ dopants, respectively. However, thermal annealing on graphene increased the sheet resistance and decreased the work function. Furthermore, the G and 2D band in the Raman spectra were recovered and Au³⁺ peak in the Au 4f spectra decreased after thermal annealing. These results suggested that the degree of doping was related to the electronegativity of the anion in the Au complex and degradation of graphene was related to the bond strength between the Au cation and counter ions. [Acknowledgement] This research was supported in part by the Basic Science Research Program and (2011-0008994) and Mid-career Research Program (2011-0028752) through the National Research Foundation of Korea (NRF) funded by the Ministry of Education, Science and Technology, and in part by the Center for Green Airport Pavement Technology (CGAPT) of Chung-Ang University.