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Air-annealing technique to improve photoelectric properties of pristine graphene

Dapeng Wei, Xuefen Song, Tai Sun, Leyong Yu, Jun Yang and Chunlei Du
Chinese Academy of Sciences, PR China

Graphene is regarded as one of the most promising candidate materials for future electronics. In fact, graphene film, deposited on metal catalyst via CVD process, normally has poly-crystalline structures and needs to be transferred onto a dielectric surface for photoelectrical applications. The transfer process usually induces contaminations, wrinkles or even breakage of graphene, which hamper the practical applications of graphene in electronics. Annealing is a simple and feasible approach to tailor the electrical properties of intrinsic graphene. Meanwhile, thermal treatment of graphene could recombine the poly-crystal structures, burn off the contaminations and strengthen the adhesion of graphene and substrates. However, few studies focus on the influences of annealing atmosphere on graphene transparent electrode, that is, whether the thermal gas causes any changes in graphene intrinsic photoelectric performances. Here, we investigated the effects of annealing atmosphere, and developed a simple and effective approach to improve photoelectric properties of pristine graphene via an air-annealing process. In contrast to PGs, the mobility and carrier concentration of air-annealing graphene films (AAGs) were significantly enhanced. The sheet resistance was greatly reduced by more than 30 percent. At the same time, the air-annealing process has also promoted the transparency of PGs by about 3%. Importantly, the as-improved photoelectric properties of AAGs were extraordinarily stable, and the transmittance and resistance remained almost no changes when repeating the same measurements after 100 days. This stable enhancement method provides a simple pretreatment approach for the practical application of graphene transparent electrode.

Biography

Dapeng Wei has completed his PhD from Peking University and Postdoctoral studies from Purdue University. Now, He works as a Professor at Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences. He has published more than 30 papers in reputed journals and His research interest is focused on the synthesis of graphene or other 2D materials.

dpwei@cigit.ac.cn

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