Lingzhi Cui

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Highly Conductive Nitrogen-doped Graphene Grown on Glass Towards Electrochromic Applications

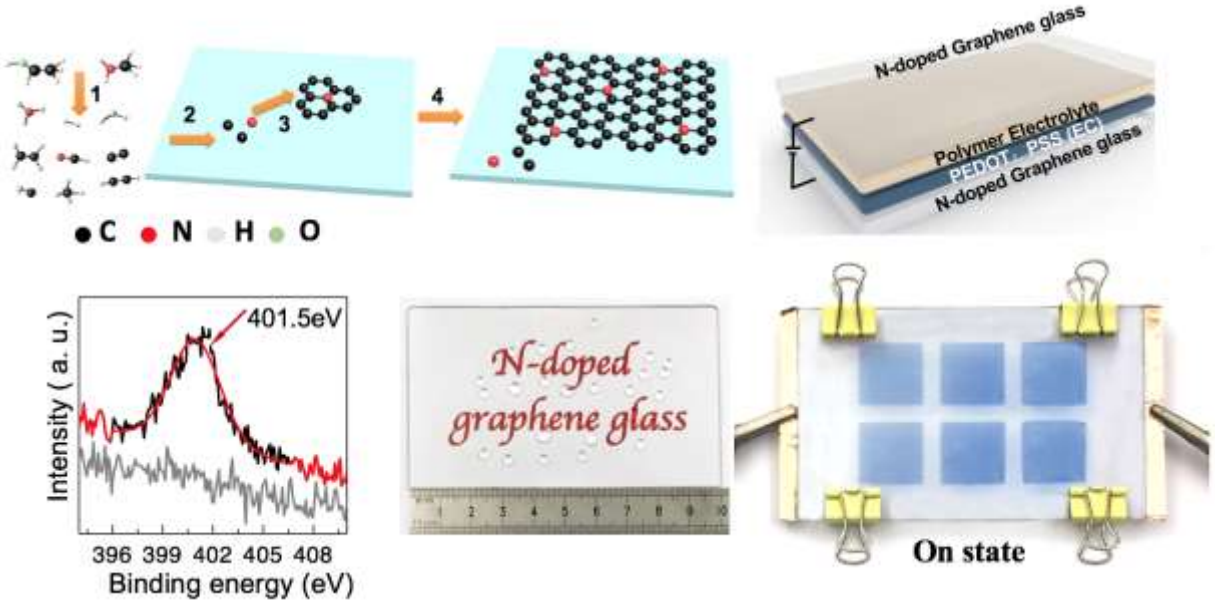
Abstract

The direct synthesis of low sheet resistance graphene on glass can promote the applications of such intriguing hybrid materials in transparent electronics and energy related fields. Chemical doping is efficient for tailoring the carrier concentration and the electronic properties of graphene that previously derived from metal substrates. Herein, we report the direct synthesis of 5-inch uniform nitrogen-doped (N-doped) graphene on the quartz glass, through a designed low- pressure chemical vapor deposition (LPCVD) route. Ethanol and methylamine were selected respectively as precursor and dopant for acquiring predominantly graphitic-N doped graphene. We reveal that, by a precise control of growth temperature and thus the doping level, the sheet resistance of graphene on glass can be as low as one half that of non-doped graphene, accompanied with relative high crystal quality and transparency. Significantly, we demonstrate that, this scalable, 5-inch uniform N-doped graphene glass can serve as excellent electrode materials for fabricating high performance electrochromic smart windows, featured with a much simplified device structure. This work should pave ways for the direct synthesis and application of the new type graphene- based hybrid material.

References

[1] Lingzhi Cui, Xudong Chen, Bingzhi Liu, Ke Chen, Zhaolong Chen, Yue Qi, Huanhuan Xie, Fan Zhou, Mark H. Rümmeli, Yanfeng Zhang, and Zhongfan Liu. Highly Conductive Nitrogen-Doped Graphene Grown on Glass toward Electrochromic Applications. *ACS Applied Materials & Interfaces* **Article ASAP**

Figures


1
2
3
4
C N H O
N-doped Graphene glass
Polymer Electrolyte
PEDOT : PSS (EC)
N-doped Graphene glass
401.5eV
Intensity (a. u.)
396 399 402 405 408
Binding energy (eV)
N-doped
graphene glass
On state