Preparation and Properties of Graphene by Microwave Method

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Abstract

The potential application of graphene includes flexible photonic/electric substrate, solar cell, Li-ion battery, medical, chemical sensor and quantum dot, etc. In this study, the graphene was prepared by microwave process [1-2]. Citric acid, urea and distilled water was mixed in various ratio and subsequently heating at 280 °C and was microwave on 6000 W power with a rotational speed of 60 rpm. Then the sample was heat in air. In addition, Ag-graphene sample was also prepared by the similar process, using the AgCl as the sources of Ag with PVP to stabilize the Ag colloidal suspension in water.

From the result of XRD, the graphene with highly oriented crystallite was successfully prepared with 0.337 nm for (002) plane. The crystallite Ag with FCC structure was confirmed coating the surface of graphene. The electrochemical properties of this Ag-GN was tested by cyclic voltammetry (CV) and charge-discharge use metal Li as the cathode. The Figure 1 shows the Charge and discharge curves of Ag-GN at various rates. This result shows that the first discharge and charge capacities of Ag-GN is 1720 and 1015 mA h/g at 0.1 C, In aditon, the N-doped graphene was test for the PL emission, which was shown in Figure 2. It displays a symmetric-like peak associated with a slight tailing under 410–480 nm and a single typical band at ca. 450 nm under 340 and 360 nm.

References

[1] Chien-Te Hsieh, Chi-Yuan Lin, Yu-Fu Chen, Jiun-Sheng Lin, Hsisheng Teng, Carbon,62 (2013) 109. numbers within [square brackets].
[2] Siyong Gu, Chien-Te Hsieh, Yasser Ashraf Gandomi, Jianlin Li, Xing Xing Yue and Jeng-Kuei Chang, Nanoscale, 11 (2019) 16553.

Figures

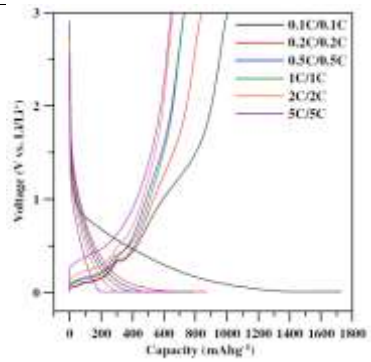

Figure 1: Charge–discharge curves of Ag/GN anodes charged and discharged at various C rates.

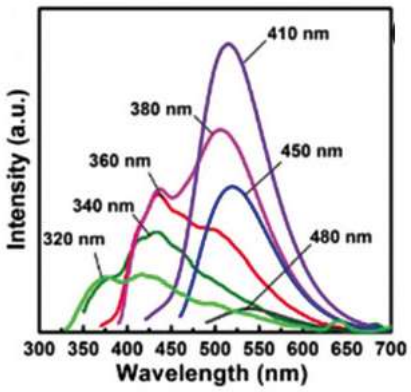

Figure 2: PL emission spectra of N-doped graphene sample in distilled water.