

A Novel Synthesis of Polyaniline Doped with Heteropolyacid and its Special Property

Jian GONG, Xiu Jun CUI, Shou Guo WANG, Zhong Wei XIE Lun Yu QU*

Faculty of Chemistry, Northeast Normal University, Changchun 130024

Abstract: Polyaniline doped with heteropolyacid was synthesized using solid-state synthesis method. XRD pattern showed that polyaniline molecule has highly ordered arrangement. Fluorescence property of the polyaniline materials was found.

Keywords: Polyaniline, heteropolyacid, fluorescence, solid-state synthesis method.

Improvement of synthesis method is particularly important since the different synthesis method will bring some special properties of material¹. The synthesis of polyaniline material has been focused on solution in a traditional synthesis method². Compared with the liquid-state method, the reaction in solid-state method happens only on the surface and the reactant molecules arrange in order.

Polyaniline doped with $\text{H}_4\text{SiW}_{12}\text{O}_{40}$ (PAN/HPA): Freshly distilled aniline (1 mL) was put in mortar and froze at -20°C for 20 min, then the mixture of $\text{H}_4\text{SiW}_{12}\text{O}_{40}$ (5 g) to $(\text{NH}_4)_2\text{S}_2\text{O}_8$ in mole ratio 1:7 was put into the mortar, furbishing for *ca.* 30 min and the colour of the reaction mixture changed to black-green, then washed with distilled water until pH=7, the product was dried under vacuum at 50°C for 48 h.

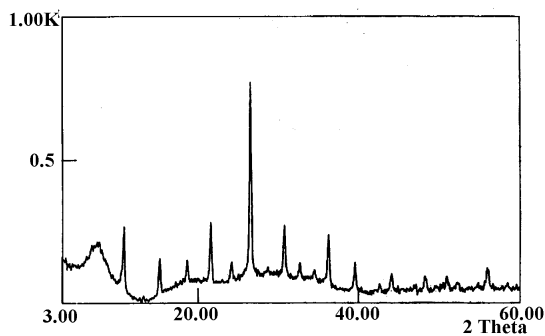
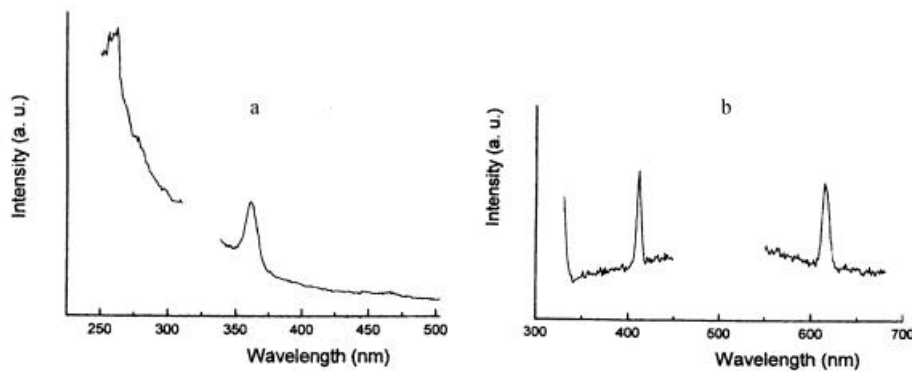
IR spectra (KBr, cm^{-1}): PAN/HPA N=Q=N 1580, N-B-N 1492, C-N 1301, 1308, 1247, Q=NH⁺-B 1144, W-O_d 972, Si-O_a 921, W-O_{c(b)}-W 882, 797.

UV-Vis spectra: Two bands at about 400 nm and 723 nm should be the characteristic absorption of the doped states of polyaniline. Moreover a stronger band at 268 nm appears which is the characteristic band of heteropoly acid³.

XRD spectra: Comparing with the XRD pattern of polyaniline prepared using liquid-state method, the XRD pattern of polyaniline prepared with solid-state method shows regular diffraction peak, this indicates that the molecules are in order and rigidity (seeing **Figure 1**).

Fluorescence property: When PAN/HPA is excited with 260 nm, there is an emission band at about 360 nm (**Figure 2a**); and when excited with 410 nm, there is an emission band at about 610 nm (**Figure 2b**). The emission band at 610 nm is rather monochromatic, showing weak inter-chain interaction.

* E-mail: guly@nenu.edu.cn

Figure 1 XRD patterns of PAN/HPA doped with $\text{H}_4\text{SiW}_{12}\text{O}_{40}$ **Figure 2** Emission and excitation spectra of PAN/HPA

References

1. J. Gong, R. N. Hua, Z. W. Xie, S. G. Wang, L. Y. Qu, *Polymer J.*, **2001**, 33, 277.
2. G. W. Hwang, K. Y. Wu, M. Y. Hua, H. T. Lee, S. A. Chen, *Synthetic Metals*, **1998**, 92, 39.
3. L. Y. Qu, Q. J. Shan, J. Gong, R. Q. Lu, *J. Chem. Soc., Dalton Trans.*, **1997**, 4525.

Received 8 June, 2001