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Benzene Tetracarboxylic Acid Doped Polyaniline Nanostructures: Morphological, Spectroscopic and Electrical Characterization

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1) Table S1: Preparation of polyaniline using different BTCA concentration and stretching frequencies of quinoid and benzenoid rings of PANI chains.

Aniline [mmol]	**BTCA [mmol]**	**APS (mmol)**	**[BTCA] : [An]**	**[An] : [APS]**	$\gamma_{C=C}$ for quinoid∗	$\gamma_{C=C}$ for benzenoid∗	**I_q/I_b∗**
0.102 g (1.1)	0.278 g (1.1)	0.248 g (1.1)	1:1	1:1	1561	1484	1.017
0.102g (1.1)	0.139 g (0.55)	0.248 g (1.1)	0.5:1	1:1	1569	1483	1.011
0.102g (1.1)	0.070 g (0.27)	0.248 g (1.1)	0.25:1	1:1	1577	1482	1.007
0.102 g (1.1)	0.028 g (0.10)	0.248 g (1.1)	0.1:1	1:1	1578	1484	1.009
0.102 g (1.1)	0.003 g (0.010)	0.248 g (1.1)	0.01:1	1:1	1598	1467	0.999

I_q and I_b are the intensities of $\gamma_{C=C}$ for quinoid and benzenoid band, respectively.
∗ These data are collected from Figure 5.

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2) **Solvent dependent UV-Vis. Study:**

It is well known that the shift in the electronic transition peak is connected with the dielectric constant (ε) of the solvent. The spectra show a bathochromic shift of λ_{max} peak with an increase in the dielectric constant of the solvent. Hence π_B-π_Q transition highly influence by dielectric constant of solvent (solvent effect) of BTCA/PANI composite.[1,2]

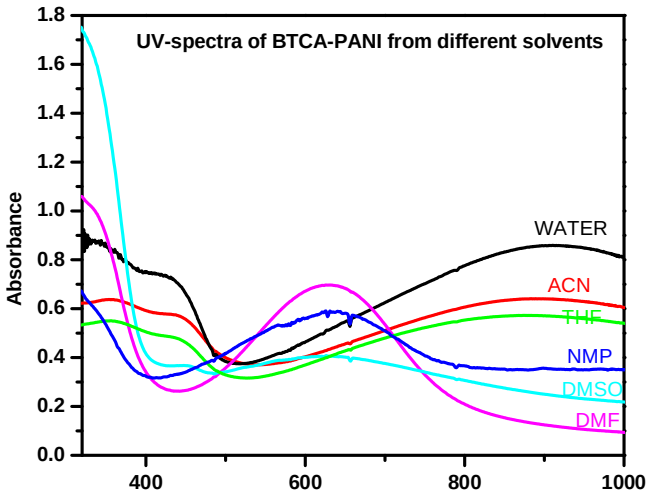

Figure S1. UV-Vis absorption spectra of BTCA/PANI(0.25) nanostructures dispersed in different solvents (typical concentration=0.1 mg/ml)

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3) UV-Vis. Spectra of ES and EB:

Synthesized BTCA/PANI composite was converted into the emeraldine base(EB) by treatment 100 mg of the sample with 1 M NH4OH solution 12 h. The base obtained was filtered, washed several times with water and dried in a vacuum for 24 h.

The 1M NH_4OH treated polyaniline nanostructures introduces an absorption band of approximately 650 nm, simultaneously disappearance of two absorption bands at 437 nm and 910 nm. The long tail to the IR of the 910 nm absorption band also disappears. The two strong absorption bands at approximately 357 nm and 690 nm are attributed to the formation of emeraldine base.[3]

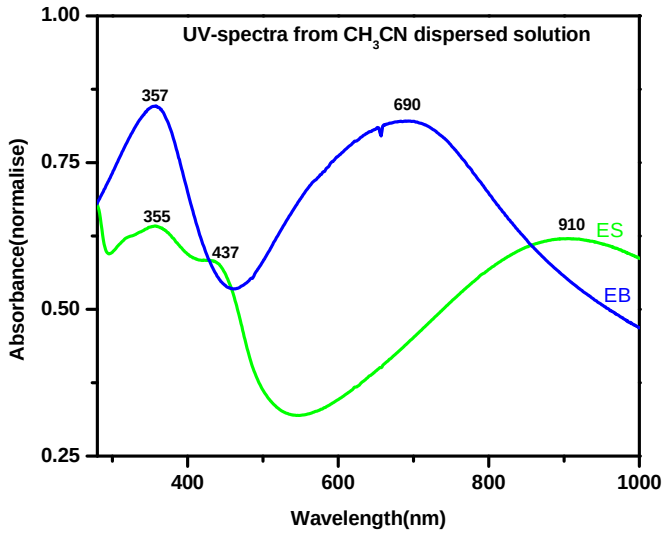

Figure S2. UV-Vis spectra of emeraldine salt (ES) and emeraldine base (EB) of BTCA/PANI(0.25) nanostructure dispersed in CH_3CN (concentration=0.1 mg/ml).

4. References:

1. C. Reichardt, *Angew. Chem. Int. Ed.*, 1965, **4**, 29.
2. S. Ghosh and V. Kalpagam, *Synth. Met.*,1989, **33**, 11.
3. P. S. Rao, D. N. Sathyanarayana and S. Palaniappan, *Macromolecules*, 2002**,** **35**, 4988.