Supporting Information Available:

Growth of Crystalline Polyaniline by Copper Catalyzed C-N Coupling at Ambient Conditions

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Characterization equipment and setup

The morphology of the product was investigated with a NOVA NANOSEM 430 field emission scanning electron microscopy (SEM), the accelerating voltages applied were 5 and 10 kV. The Fourier infrared spectroscopy (FT-IR) was performed with Brukev Optik Vector 33-MIR, and Raman spectroscopy with HJY LabRAM Aramis using 532 nm laser. X-ray diffraction (XRD) was performed with a PANalytical X'Pert Pro at θ/2θ mode using Cu Kα as X-ray source, the step was set at 0.033° and the delay time was 10 s. The chemical states of copper were analyzed with Kratos Axis Ulra DLD X-ray photoelectron spectroscopy (XPS) using Al Kα photons with the pass energy of 40 eV. Pyrolysis-gas chromatography mass spectrometer (Py-GCMS) was performed with Shimadzu GCMS-QP2010plus to investigate the configuration of the polymer chains. Gel permeation chromatography (GPC) was performed with Waters 1515 to analyze the molecular weight and distribution. Both the Py-GCMS and GPC results were presented in supporting information with detailed measurement conditions. A Shimadzu GCMS-QP 2010 plus instrument was used to analyze the structure of the polymer chain. Separation was carried out using a RxiTM-5ms quartz column (30m×0.25μm). Helium was used as carrier gas. The column flow was 1.0 mL/min and the purge flow was 3.0 mL/min in split mode. The initial oven temperature was set at 50 ℃ and then ramped up to 250 ℃ at a rate of 10℃/min and 2 min hold time. The temperatures of the injection, ion source and interface were 280 ℃, 230 ℃ and 280 ℃, respectively. Ion masses were scanned from 33 to 700 m/z at 1428 scans per second. A waters 1515 GPC instrument was used to analyze the molecular weight and distribution of the as-obtained product. The GPC columns (7.8 mm×300 mm length) were Waters Styragel@HR 2, 4 and 6. DMF was used as solvent and the flow rate was 1 ml/min. The temperature of the column was 60 ℃ and that of the detector was 40℃. The molecular weight was calculated based on internal standard method using polymethyl methacrylate as calibration material.

Pyrolysis gas chromatography -mass spectrometer (Py-GCMS) analysis of the as-obtained product

As shown in Fig. S1, a majority of aniline with a small quantity of benzene were identified from the fragments of the product, indicating the monomer of the polymer chain being aniline.

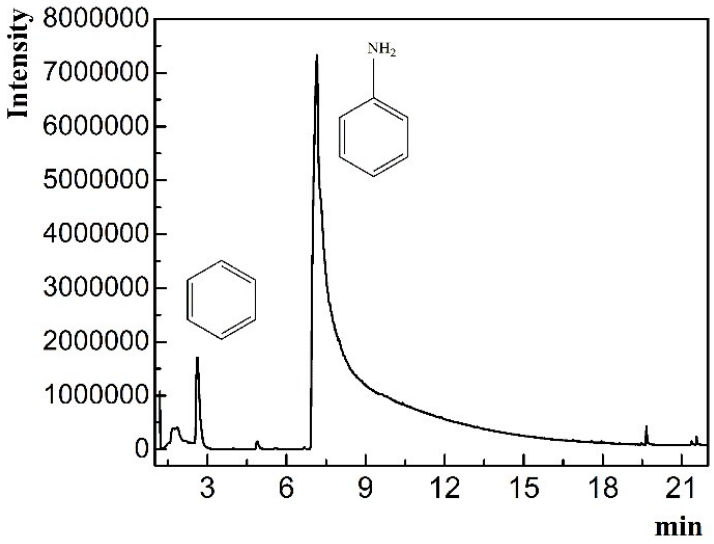

Fig. S1 Py-GCMS spectrum obtained at a retention time of 2 min.

Gel permeation chromatography (GPC) analysis of the as-obtained product

The calculated molecular weight was 2100, which corresponding to a polymerization of 210 for polyaniline. The weight distribution is narrow as shown by Fig. S2.

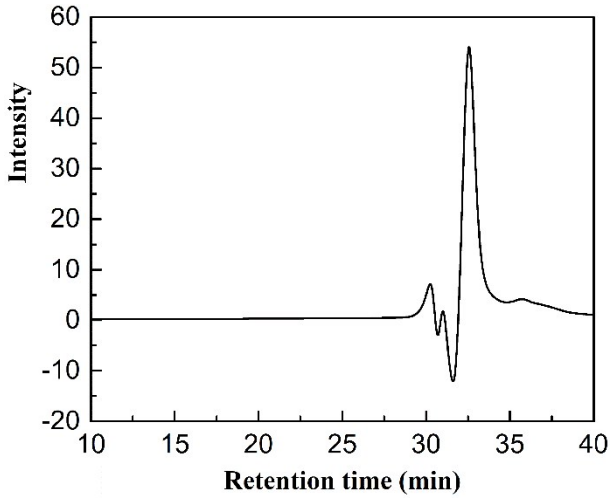

Fig. S2 GPC spectrum of the as-obtained polyaniline sample.

Indexing of the as-obtained polyaniline

The d spacing values were calculated from the diffraction peaks shown in Fig. 3 according to Bragg's law $\lambda = 2dsin\theta$, where $\lambda = 1.5418\text{Å}$. The lattice planes were determined based on the calculation by PowderCell 2.4 software.

Tab.S1 *d* spacing, intensity and (hkl) indexing calculated from the XRD pattern shown in Fig.3 for the as-obtained polyaniline.

2θ /°	d spacing /Å	Intensity/%	Lattice plane

7.63	11.59	100	(001)
14.49	6.11	3.03	(011)
15.25	5.81	4.64	(002)
15.85	5.59	20.40	(110)
19.94	4.45	12.39	(200)
21.00	4.23	3.92	(201)
21.82	4.07	11.86	(112)
22.71	3.92	8.80	(003)
22.84	3.89	10.35	(210)
24.46	3.64	13.57	(211)(020)
24.86	3.58	30.58	(103)(202)
26.51	3.36	8.19	(120)
27.46	3.25	4.28	(121)
28.09	3.18	4.45	(113)(212)
30.24	2.96	9.71	(004)(122)
33.3	2.69	3.39	(311)
34.43	2.60	2.63	(114)
35.12	2.56	3.99	(123)
35.58	2.52	3.35	(312)
36.47	2.46	3.67	(204)