Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

A Ratiometric Fluorescent Thermometer Based on Amphiphilic Alkynylpyrene Derivatives

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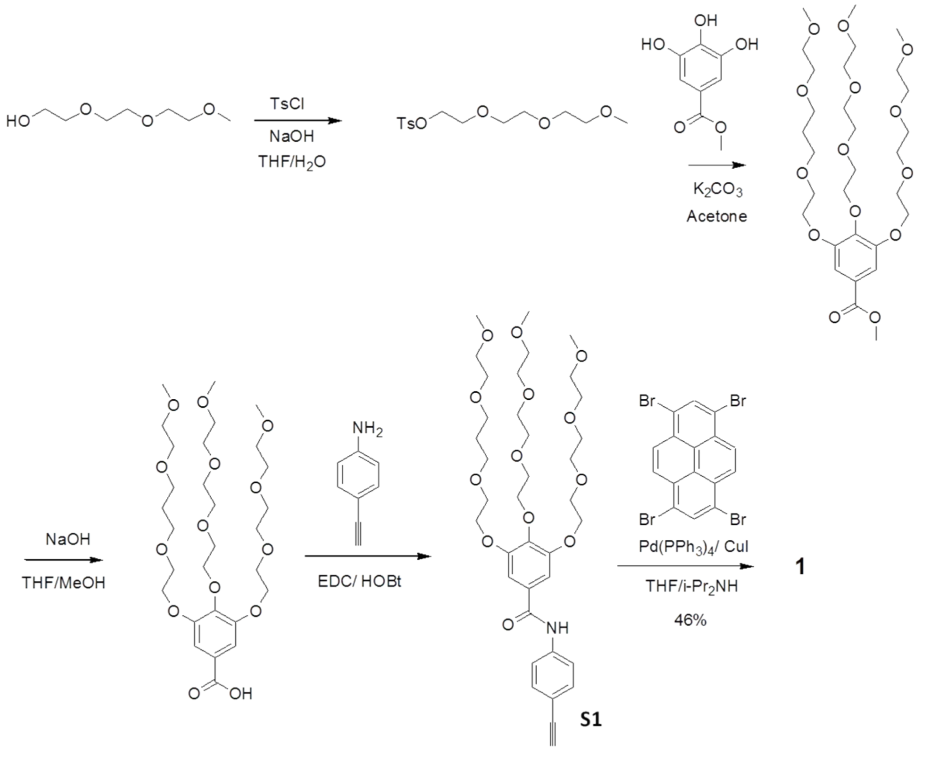
Experimental Section: All reagents and solvents were purchased from commercial sources. THF was distilled from sodium, *i*-Pr_2NH was dried from potassium hydroxide. All reactions were performed in standard glassware under an inert N_2 atmosphere. Compound **S1** was prepared as the reported procedure.[1] ^1H NMR, and ^{13}C NMR spectra were recorded on Bruker 300 or 400 MHz Spectrometer at 298 K. The ^1H and ^{13}C NMR chemical shifts are reported relative to residual solvent signals. Coupling constants (J) are denoted in Hz and chemical shifts (d) in ppm. Multiplicities are denoted as follows: s= singlet, d= doublet, m= multiplet, br= broad. The UV-visible absorption spectra were determined with TU-1901 double beam UV-vis spectrophotometer as powders. The fluorescence spectra of the samples were measured with a Hitachi F-7000 fluorescence spectrophotometer using a monochromated Xe lamp as an excitation source. Samples for absorption and emission measurements were contained in 1 cm×1 cm or 1 cm×2 mm quartz cuvettes, all the tests were carried out in the room temperature if not mentioned. SEM images were obtained using an S-4800 (Hitachi Ltd.) with an accelerating voltage of 1.0 kV or 10.0 kV. Samples were prepared by dropping dilute solution onto a silicon wafer.



Scheme S1. Synthesis route of compound **1**.

Synthesis of compound 1: A solution of **S1**(1.13g, 1.60mmol), 1,3,6,8-tetrabromopyrene (165mg, 0.32mmol), Copper iodide (6mg, 0.032mmol) and tetrakis(triphenylphosphine)palladium (74mg, 0.064mmol) in a mixture of 30 mL of diisopropylamine and 60 ml of THF was stirred at 80 ℃ for 24 h under N_2 atmosphere. The solvent was removed by evaporation on a rotary evaporator. The reaction mixture was extracted with CH_2Cl_2 (100mL) and H_2O (100mL). The combined organic layers were concentrated and subjected to flash column chromatography on silica gel (eluent: acetone/methanol, 30/1, v/v) to afford 440mg of **1** as a red solid in 46%. ^{1}H NMR ($CDCl_3$, 400 MHz): d= 8.92 (s, 4H), 8.55 (s, 4H), 8.30 (s, 2H), 7.75 (d, J=8.0 Hz, 8H), 7.63 (d, J=8.0 Hz, 8H), 7.23 (s, 8H), 4.21-4.17 (m, 24H), 3.81-3.75 (m, 12H), 3.69-3.67 (m, 12H), 3.64-3.58 (m, 72H), 3.52-3.47 (m, 24H), 3.34 (s, 12H), 3.30 (s, 24H); ^{13}C NMR ($CDCl_3$, 100 MHz): d=25.50, 29.17, 58.84, 58.90, 67.86, 68.92, 69.65, 70.30, 70.35, 70.37, 70.43, 70.46, 70.51, 71.77, 71.79, 72.25, 87.53, 96.09, 107.71, 118.67, 118.76, 120.58, 123.55, 126.38, 129.84, 131.19, 132.31, 138.80, 141.54, 152.29, 165.63 ppm; MALDI-TOF-MS of **1**: m/z calcd for $C_{160}H_{214}N_4O_{52}$ $[M+H]^+$ 3024.43; found:3024.5549.

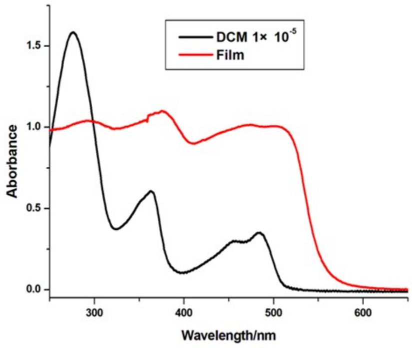


Fig. S1 Normalized UV/Vis spectra of compound **1** in dilute solution (1.0×10^{-5} M) and in the film state.

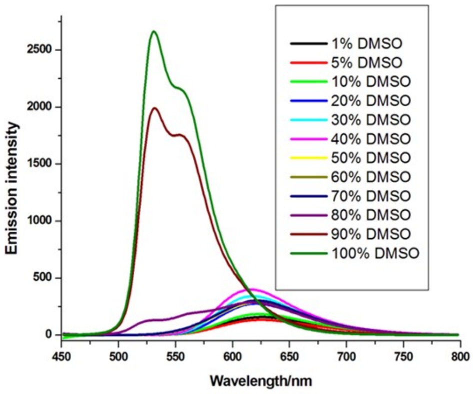


Fig. S2 Fluorescence emission spectra of **1** in DMSO/H_2O mixtures with different DMSO fractions at a fixed concentration (2.5×10^{-5} M, λ_{ex}=430 nm)

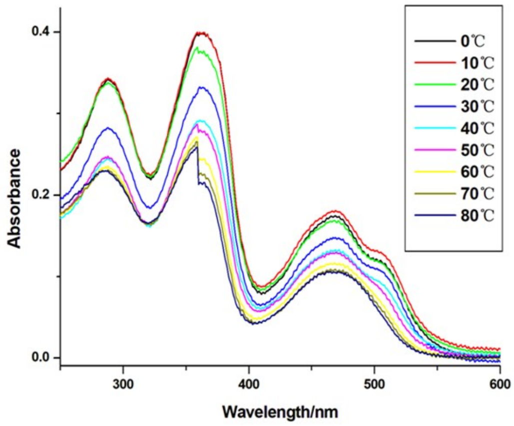


Fig. S3 UV/Vis spectra of compound **1**in IPA (2.5×10^{-5} M) recorded from 0°C to 80°C.

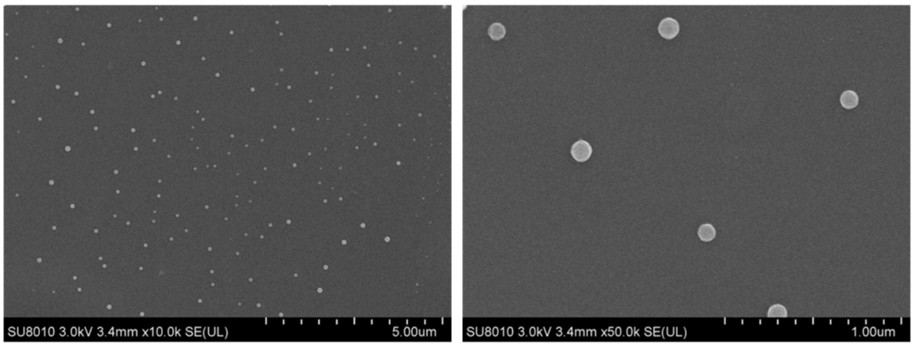


Fig. S4 Selected SEM image of **1** prepared in DMSO/H_2O mixture (v:v 3:7).

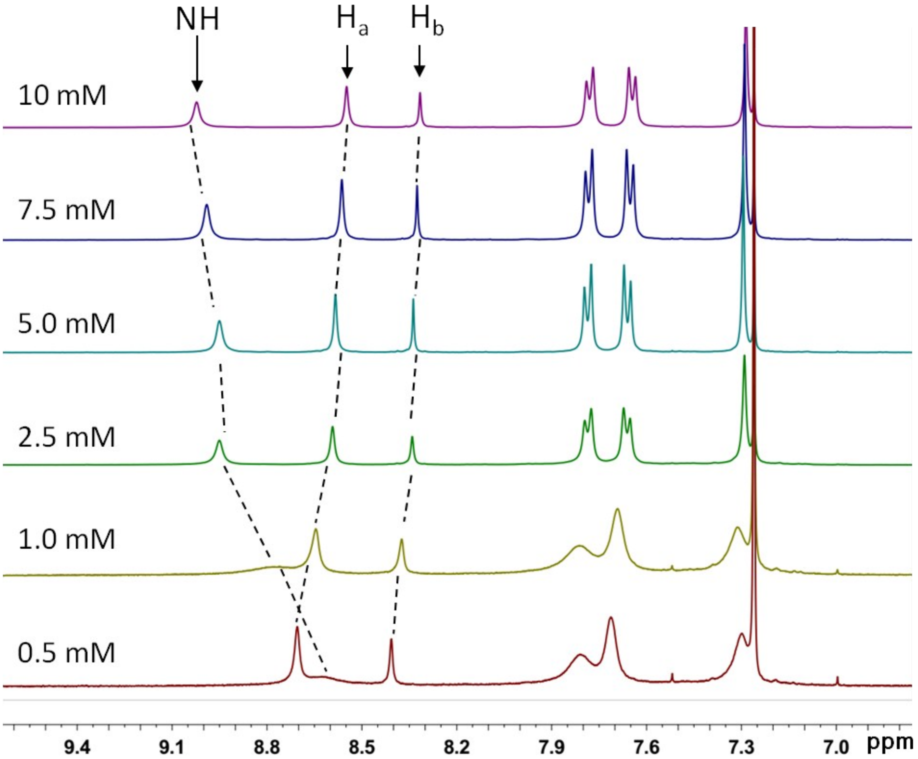


Fig. S5 ^{1}H NMR spectra (400 MHz, CDCl$_3$, 298 K) of compound **1** at different concentrations.

Fig. S6 Photoimage illustrating the luminescent color changes of **1** upon different concentrations (from left to right: 0.5×10^{-2} M, 1.0×10^{-3} M, 0.5×10^{-3} M) under 365 nm handheld UV lamp.

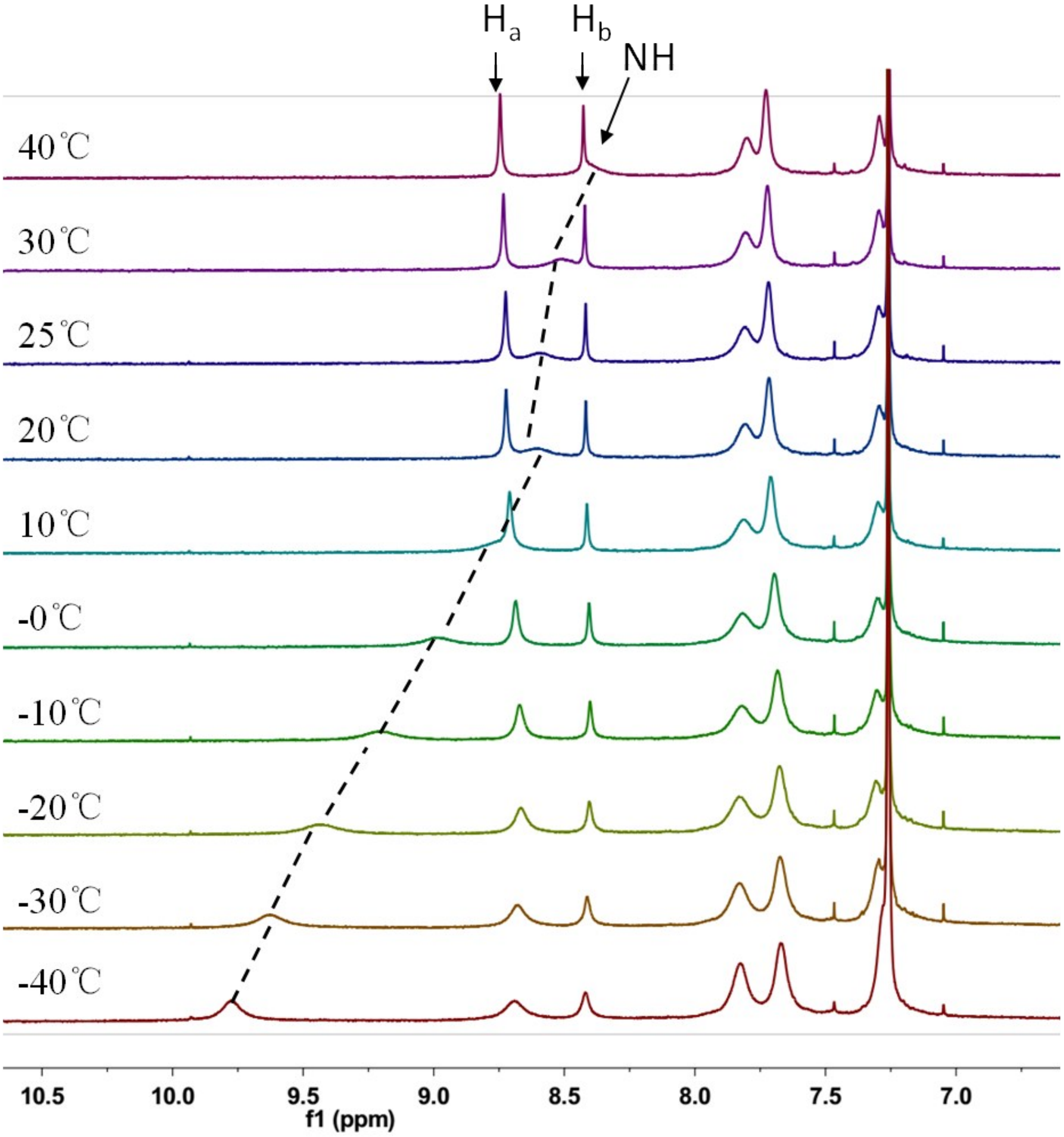


Fig. S7 Temperature dependent ^{1}H NMR spectra of **1** in $CDCl_3$ (500 MHz, 2.5 mM).

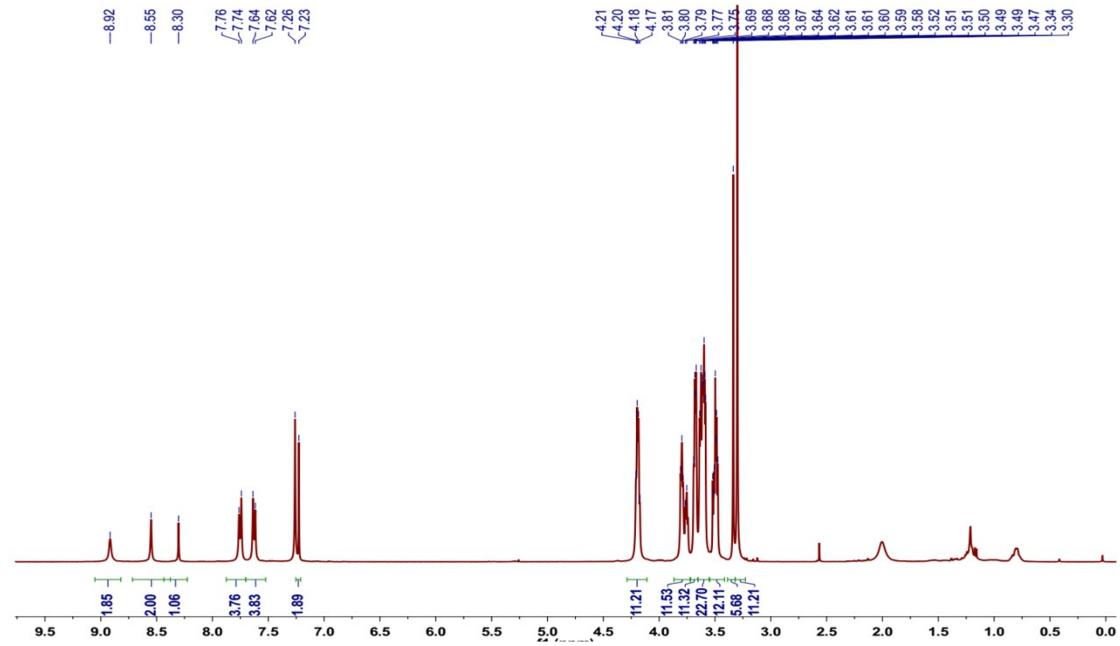


Fig. S8 ^{1}H NMR spectrum of compound **1** in $CDCl_3$ (400 MHz) at 25 °C.

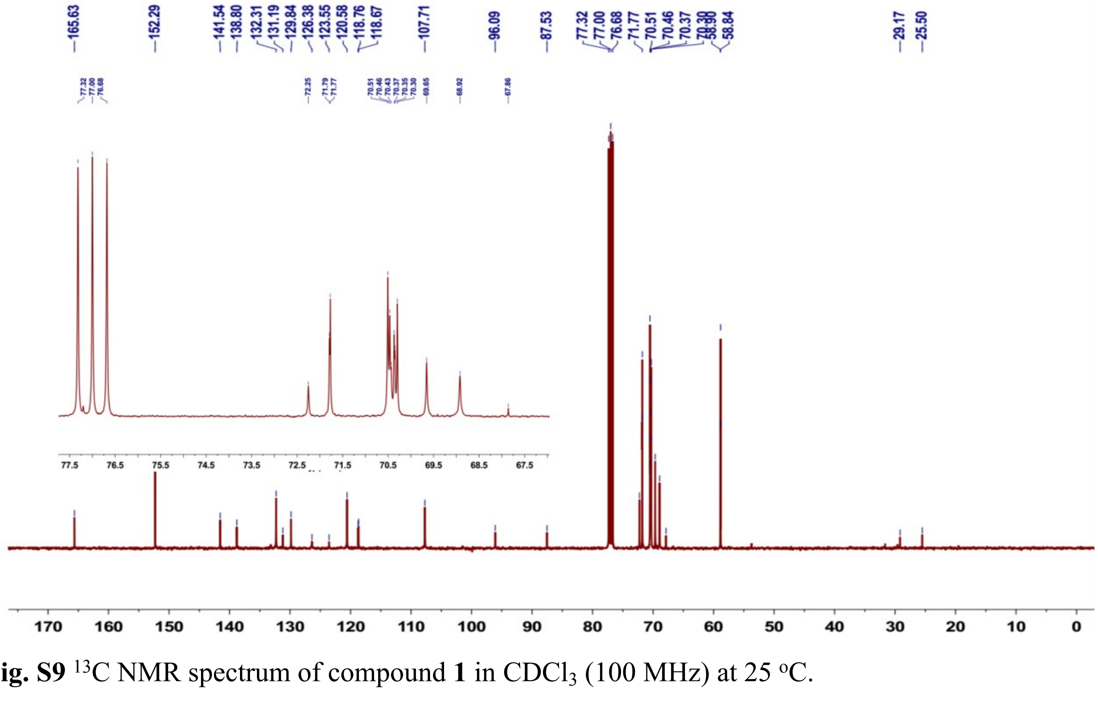


Fig. S9 ^{13}C NMR spectrum of compound **1** in $CDCl_3$ (100 MHz) at 25 °C.

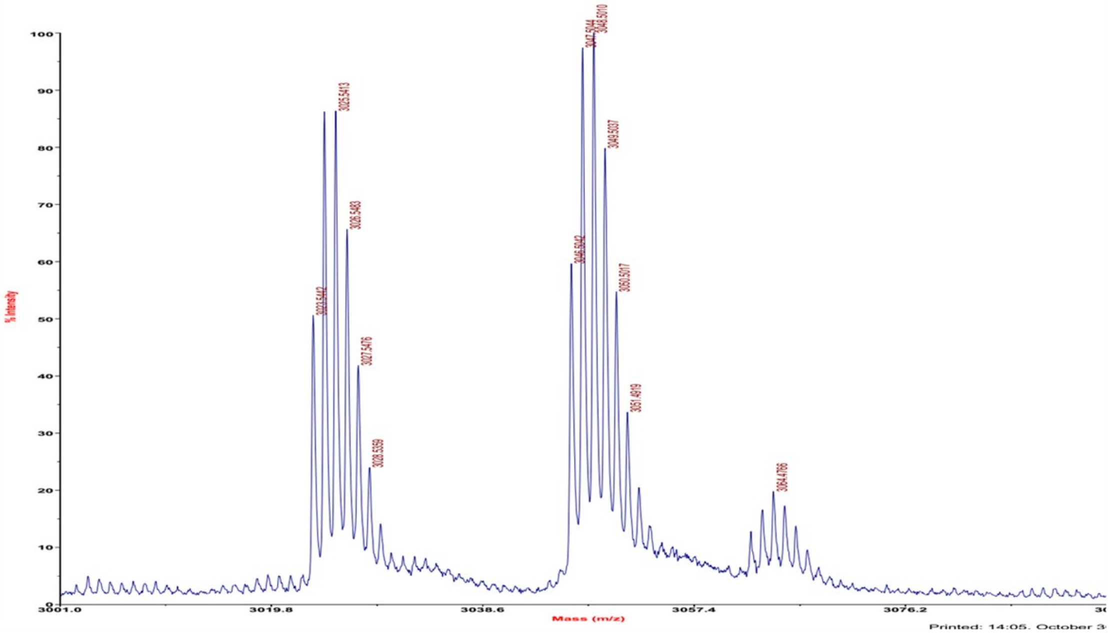


Fig. S10 MALDI-TOF-MS spectra of compound **1**.

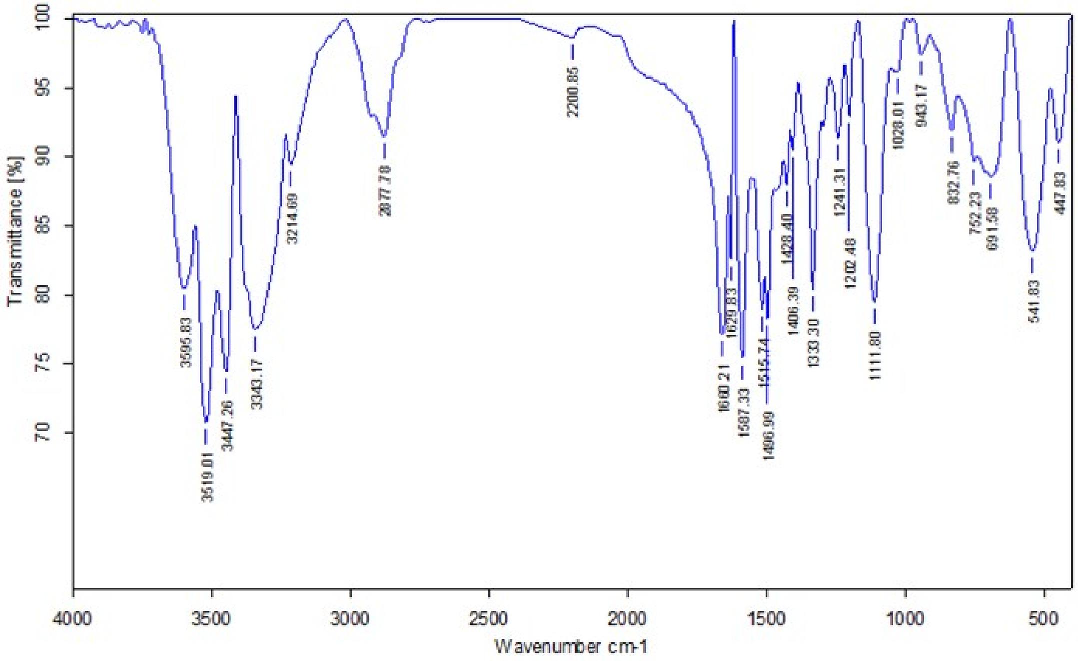


Fig. S11 FTIR spectra of compound **1**.

[1] E. Shi, Z. Gao, M. Yuan, X. Wang and F. Wang, *Polym. Chem.*, 2015, **6**, 5575-5579.