Electronic Supporting Information for

Fluorinated Polyhedral Oligomeric Silsesquioxane

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1. Instrumentation

^{1}H, ^{13}C NMR, ^{29}Si nuclear magnetic resonance (NMR) spectra were recorded on a Bruker DRX 400 MHz spectrometer in $CDCl_3$ at room temperature. Spectrometer operating frequencies were 400.13 MHz (^{1}H), 100.61 MHz (^{13}C), and 79.46 MHz (^{29}Si). Tetramethylsilane was used as an internal standard for ^{1}H, ^{13}C, and external standard for ^{29}Si NMR spectra. ^{19}F NMR spectra (operating frequencies: 276.47 MHz) were recorded on AV400 MHz, and instrument default calibration ($CFCl_3$) was used. Thermogravimetric analysis (TGA) was performed in a Perkin-Elmer thermogravimetirc analyzer (TGA 7) in nitrogen or in air at a heating rate of 20 ^{o}C/min. Differential scanning calorimetry (DSC) experiments were studied on a TA instrument DSC 2920 under a heating and cooling rate of 10 °C/min in nitrogen. Elemental analysis was conducted on a Perkin-Elmer 240C elemental analyzer for C, H, and S determination at the Chemical and Molecular Analysis Center, Department of Chemistry, National University of Singapore.

Spin coating for water contact angle was conducted on Rame-Hart Contact angle goniometer, with 5 wt.% of FluoroPOSS in PMMA solution (10 mg/mL in $CHCl_3$).

Atomic Force Microscopy (AFM) experiments: FluoroPOSS was dissolved in mr-I PMMA (bought from Micro Resist Technology GmbH) at a concentration of 0.3 mg/mL and 1 mg/mL. The rotation speed during spin coating was set 2000 rpm and last for 30s. Nanotribology experiments were performed by a Nanoscope III scanning probe microscopy (Veeco-Digital Instruments (DI), Santa Barbara). Commercially available V shaped Si_3N_4 cantilevers (DI) were used. Each cantilever was calibrated after a given experiment by measuring the thermal excitation of the tip to compute its spring constant. Tapping mode AFM scans was performed in air using a non-coated silicon tip with a spring constant of 10 N/m~20N/m (Nanosensors, Wetzlar, Germany). Features on the nanometer scale were imaged on a minimum of three different areas on the sample.

2. NMR spectra

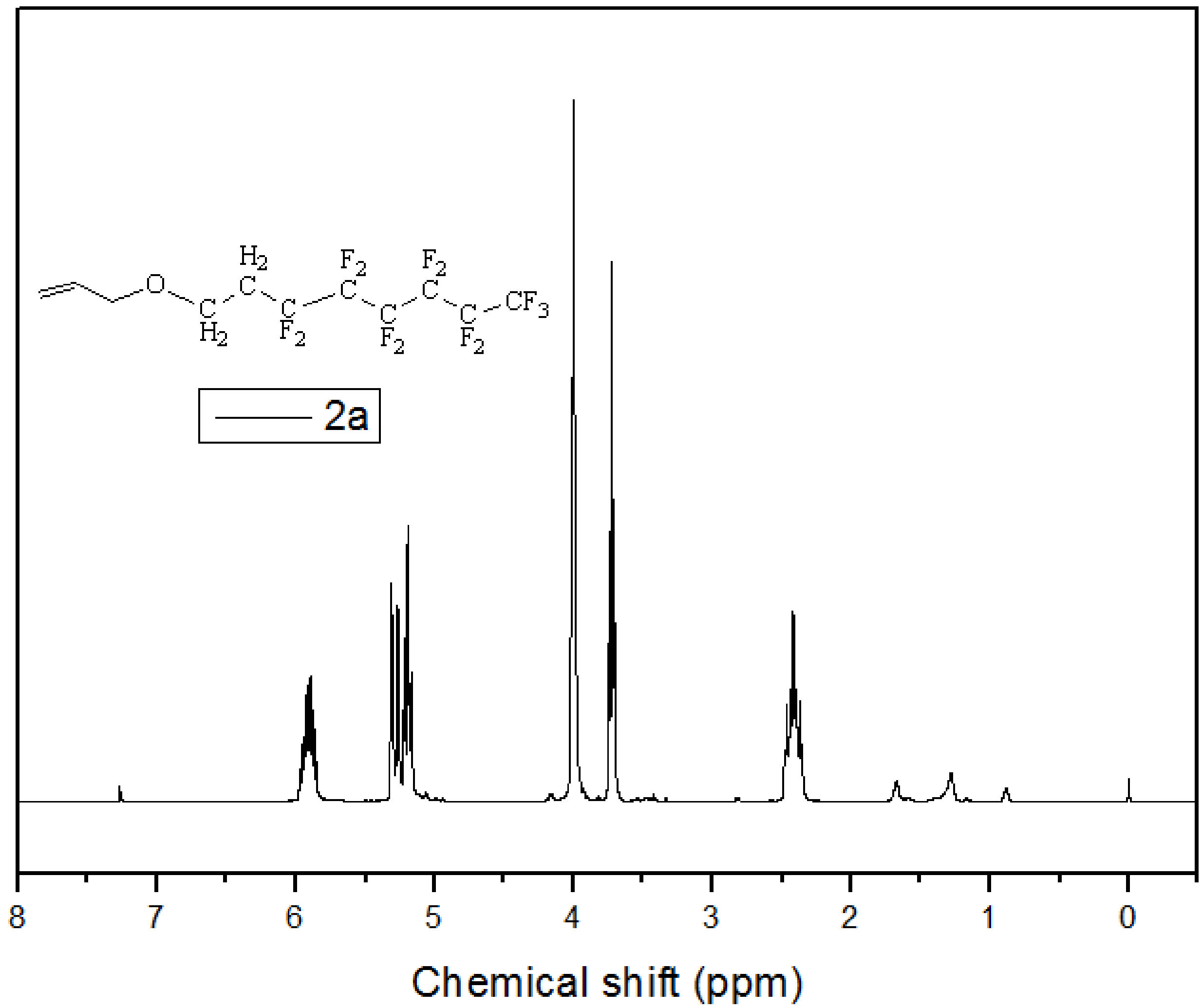

Figure S1: ^1H NMR of compound **2a** in $CDCl_3$ at room temperature.

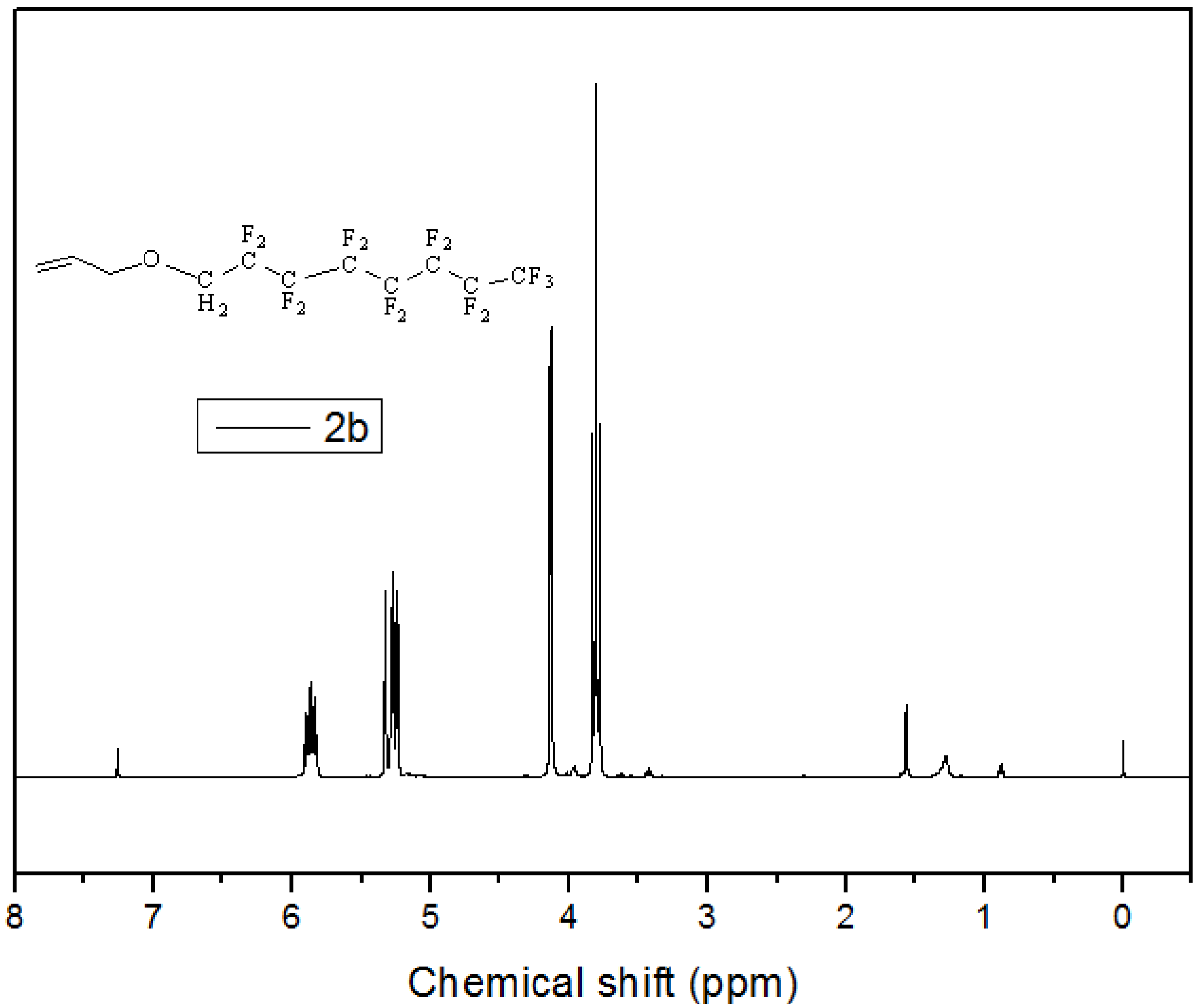

Figure S2: ^{1}H NMR of compound **2b** in $CDCl_3$ at room temperature.

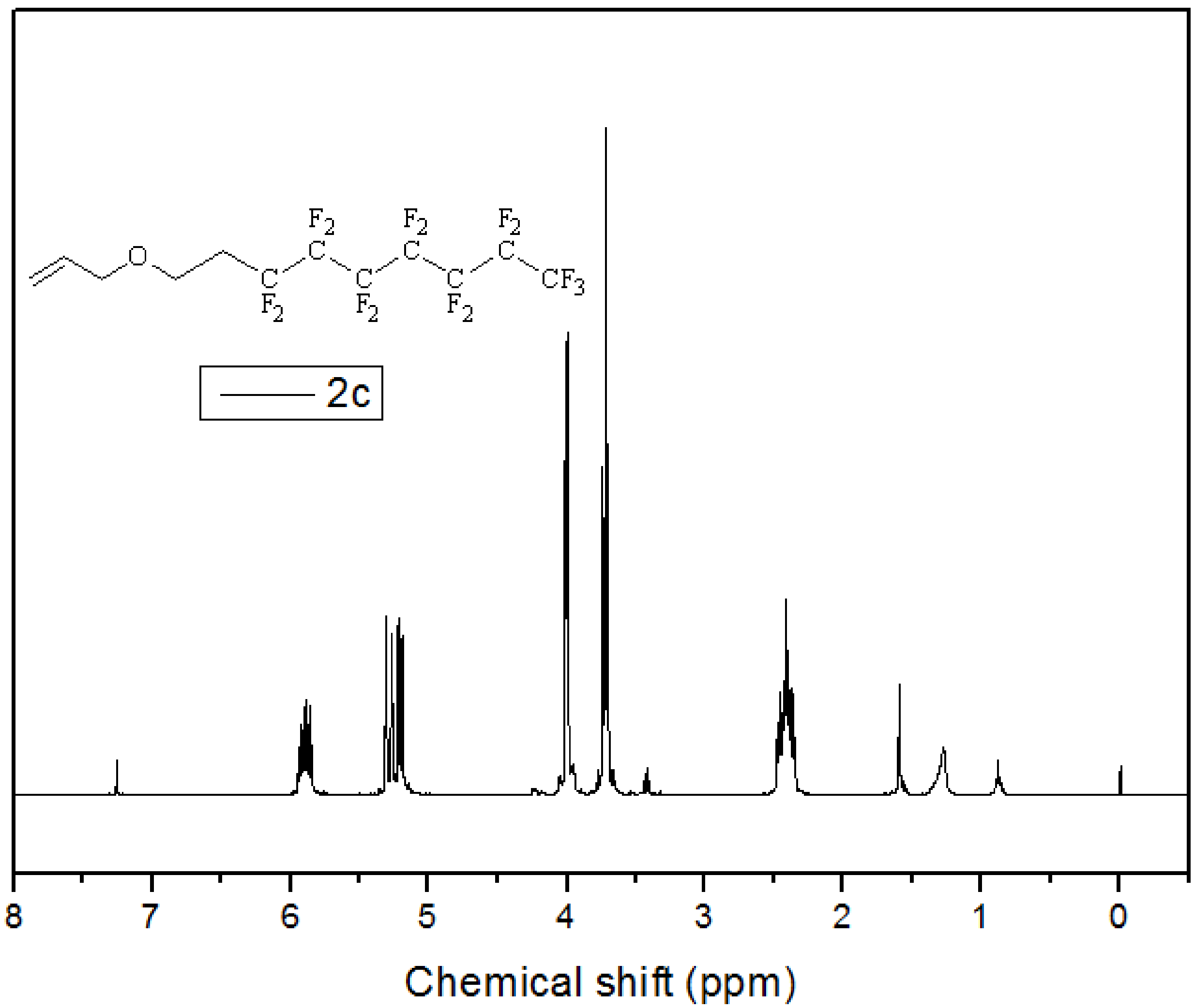

Figure S3: ^{1}H NMR of compound **2c** in $CDCl_3$ at room temperature.

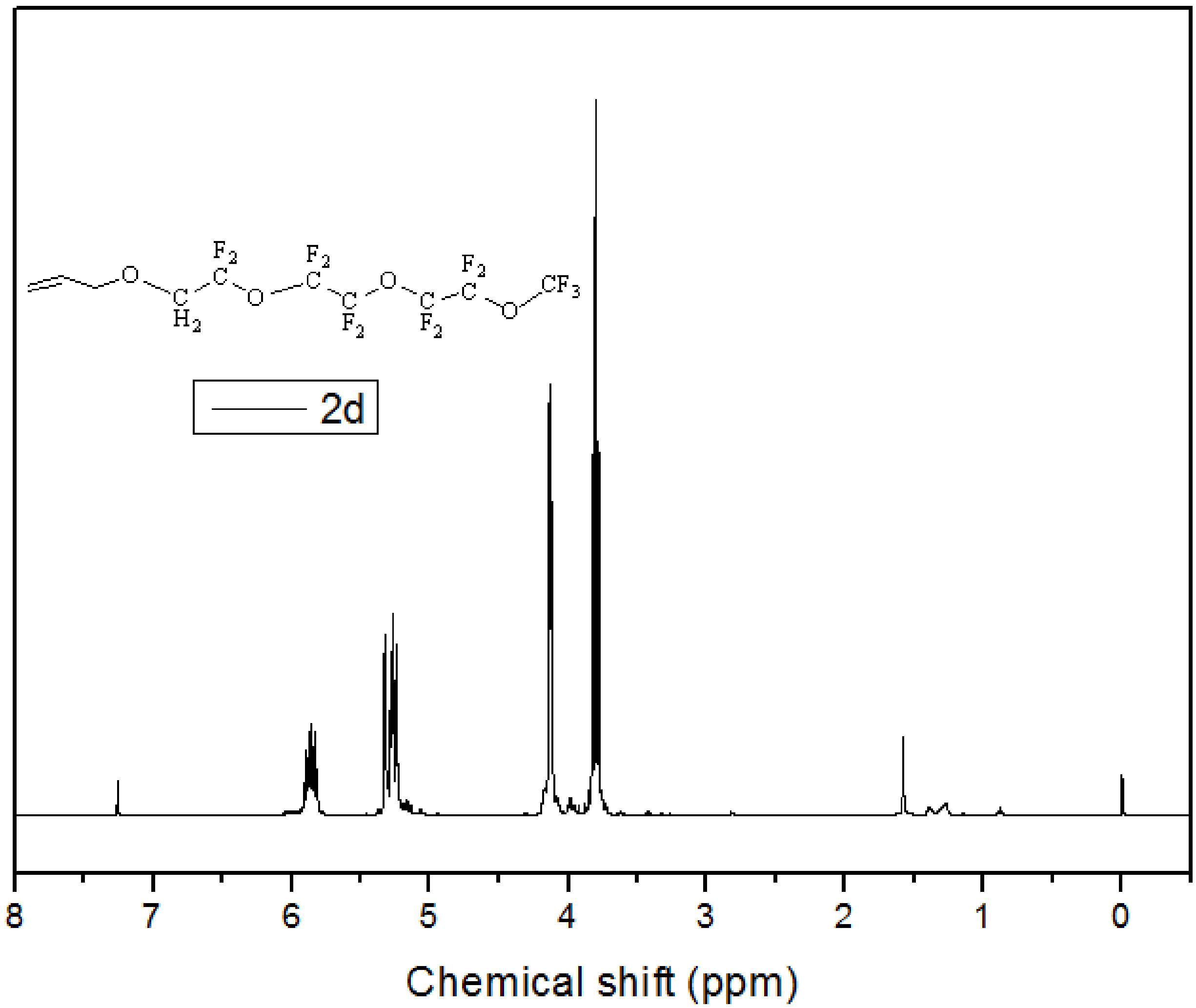

Figure S4: ^{1}H NMR of compound **2d** in $CDCl_3$ at room temperature.

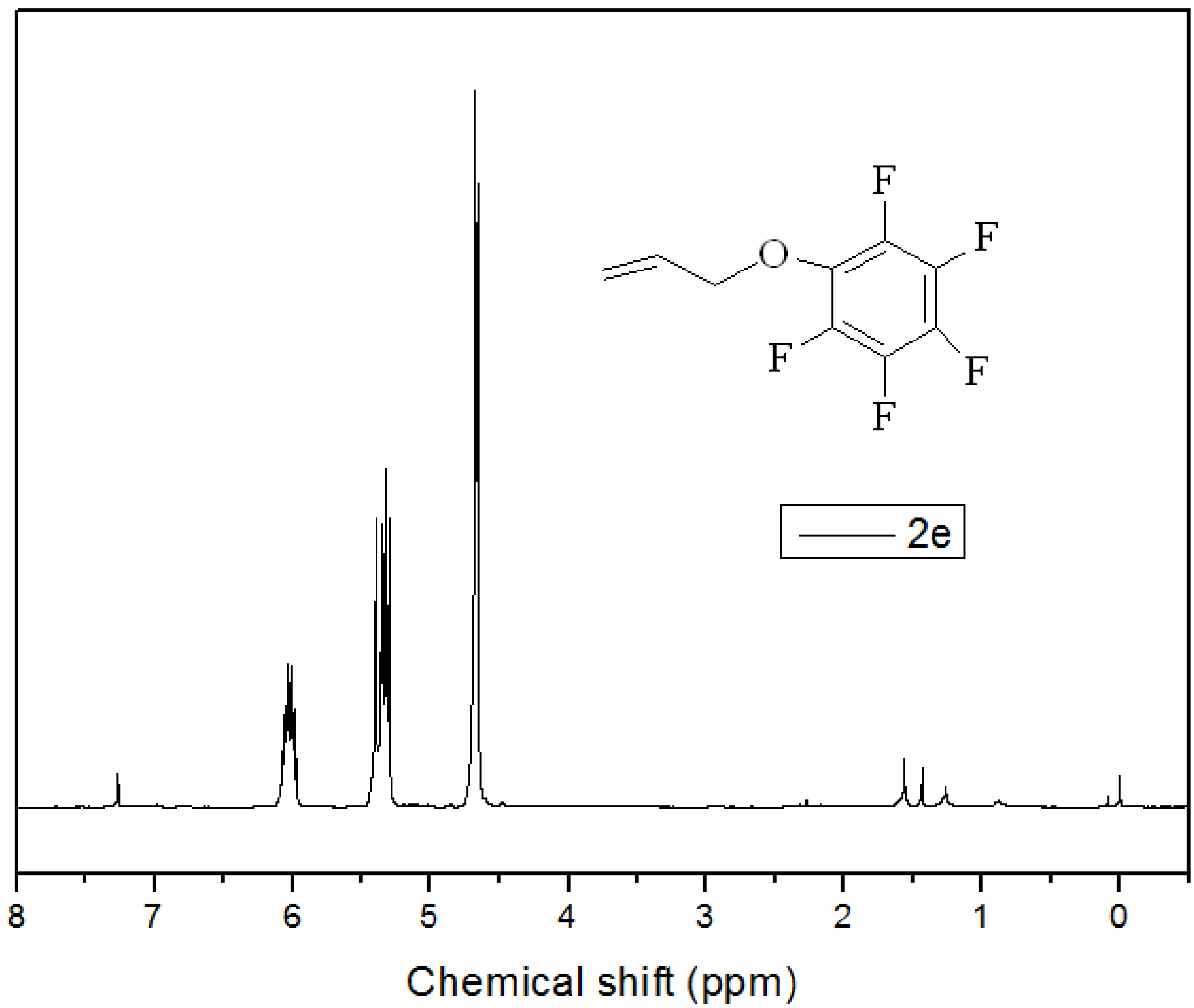

Figure S5: ^{1}H NMR of compound **2e** in $CDCl_3$ at room temperature.

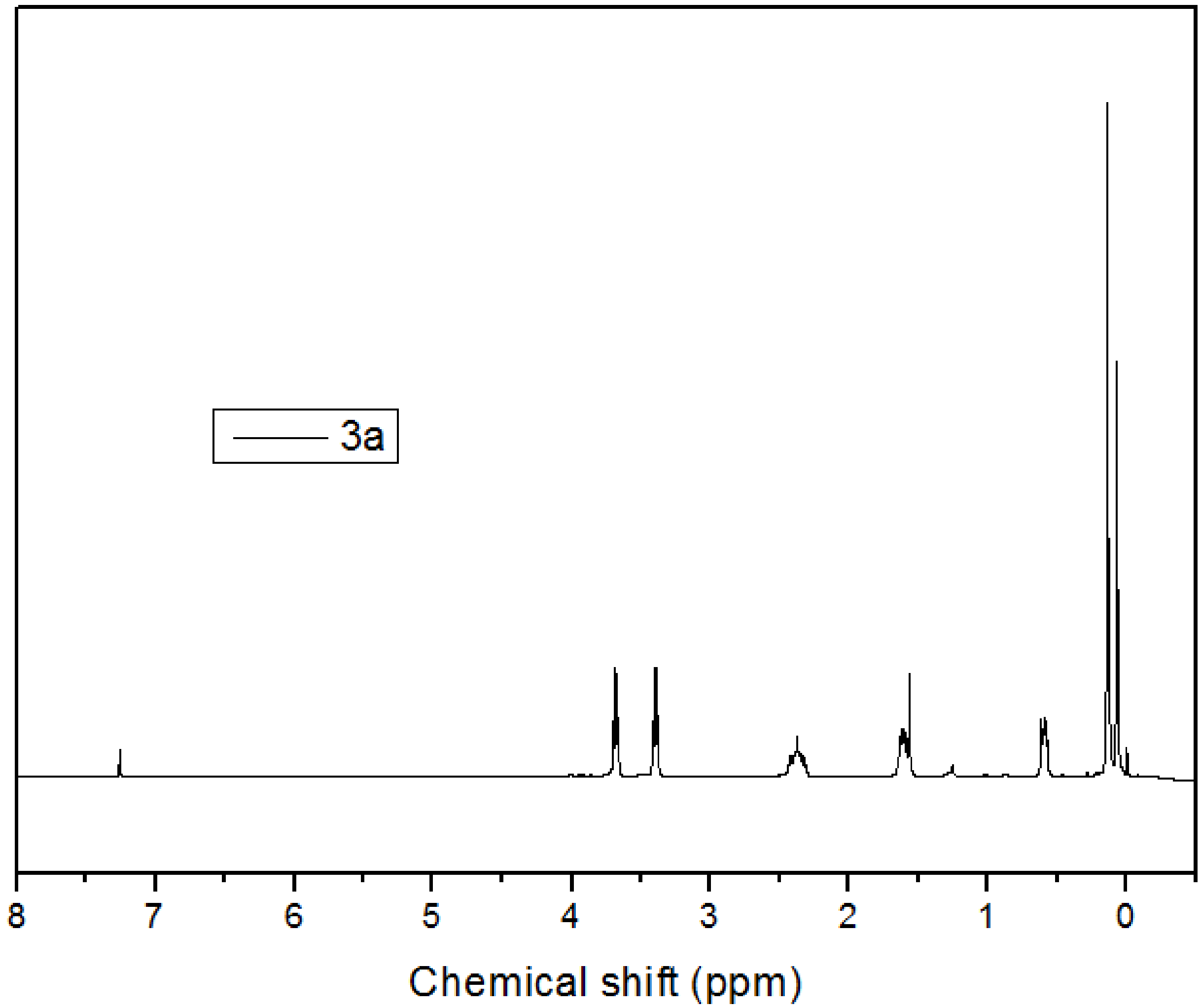

Figure S6: ^{1}H NMR of compound **3a** in $CDCl_3$ at room temperature.

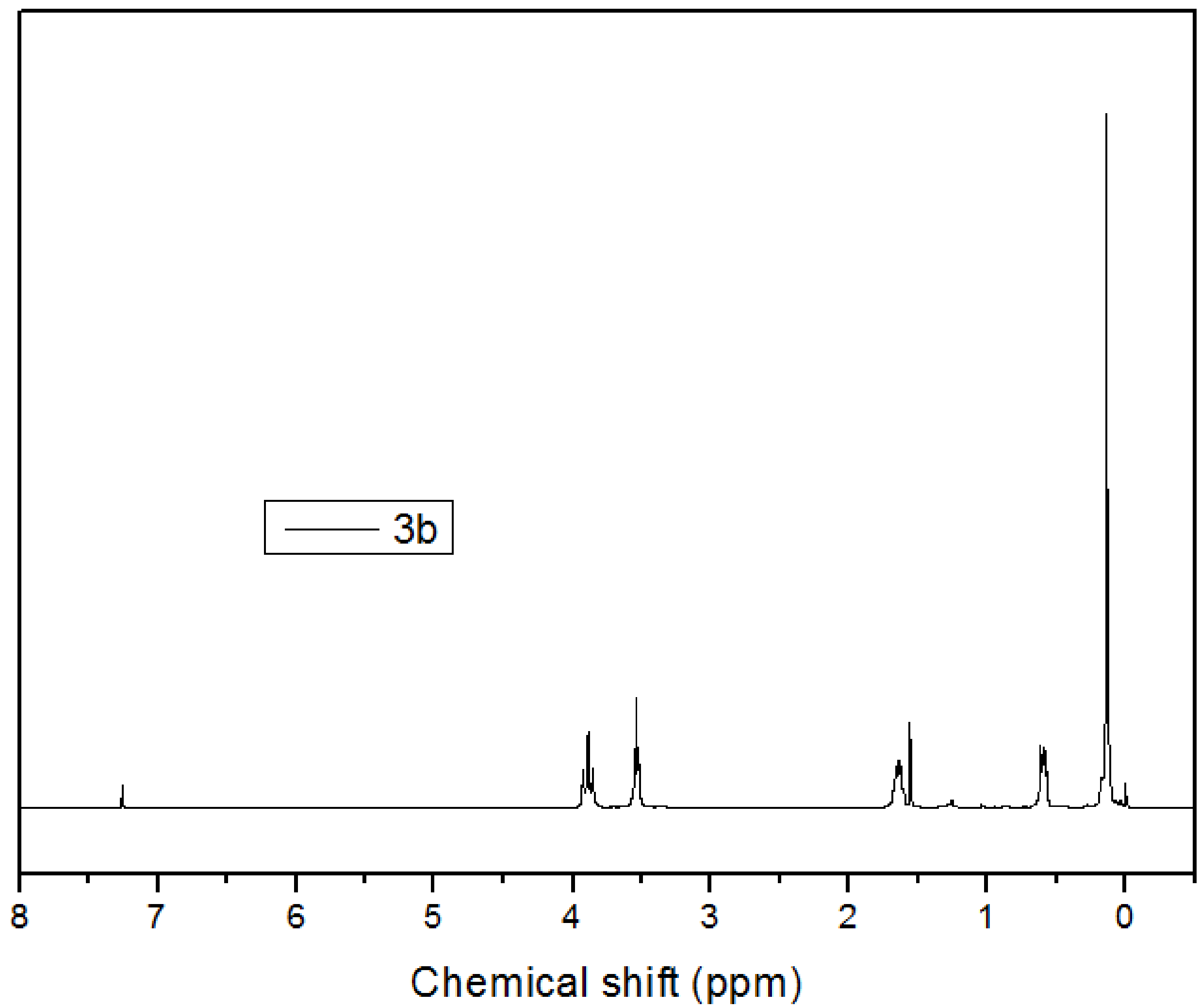

Figure S7: ^{1}H NMR of compound **3b** in $CDCl_3$ at room temperature.

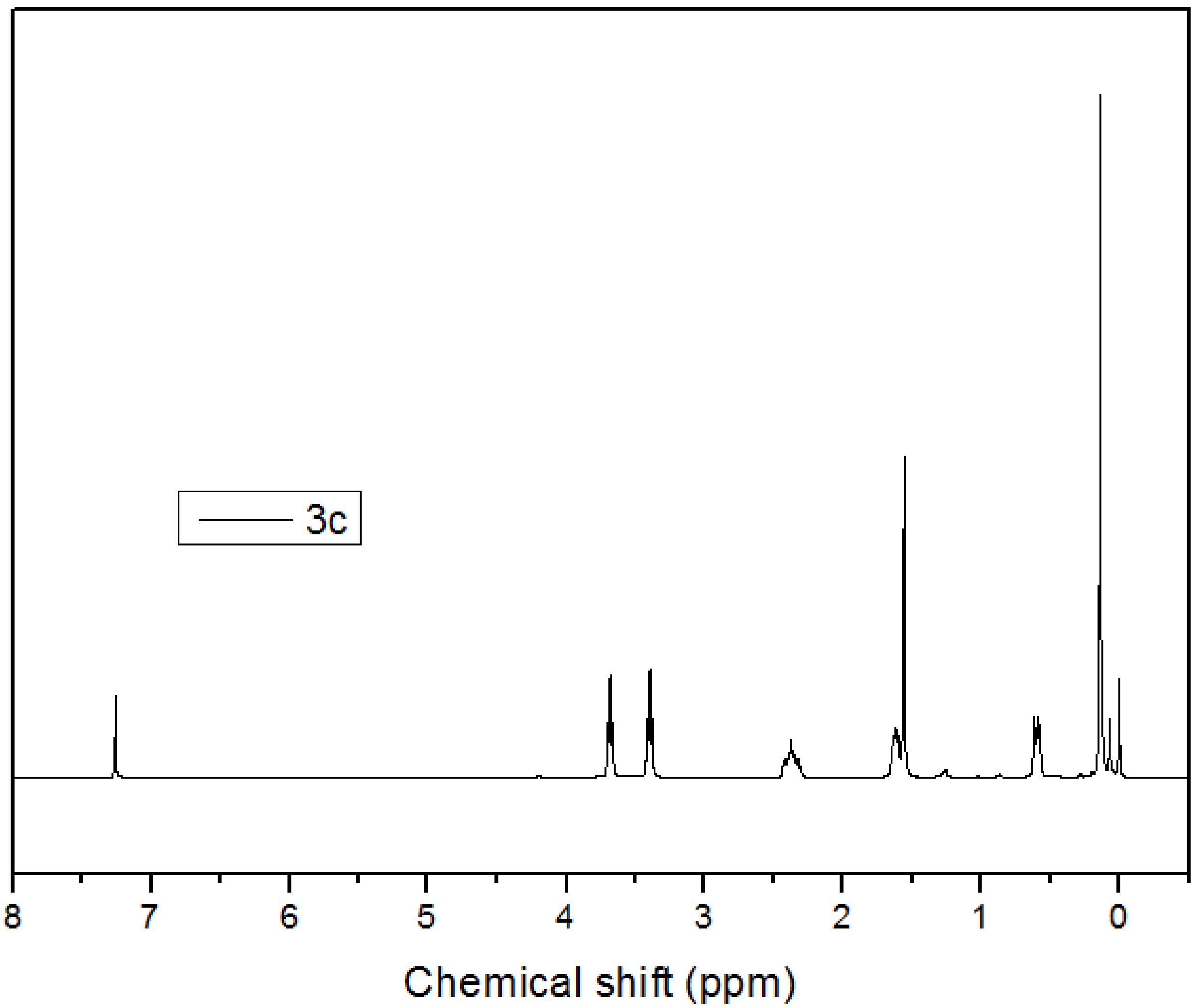

Figure S8: ^{1}H NMR of compound **3c** in $CDCl_3$ at room temperature.

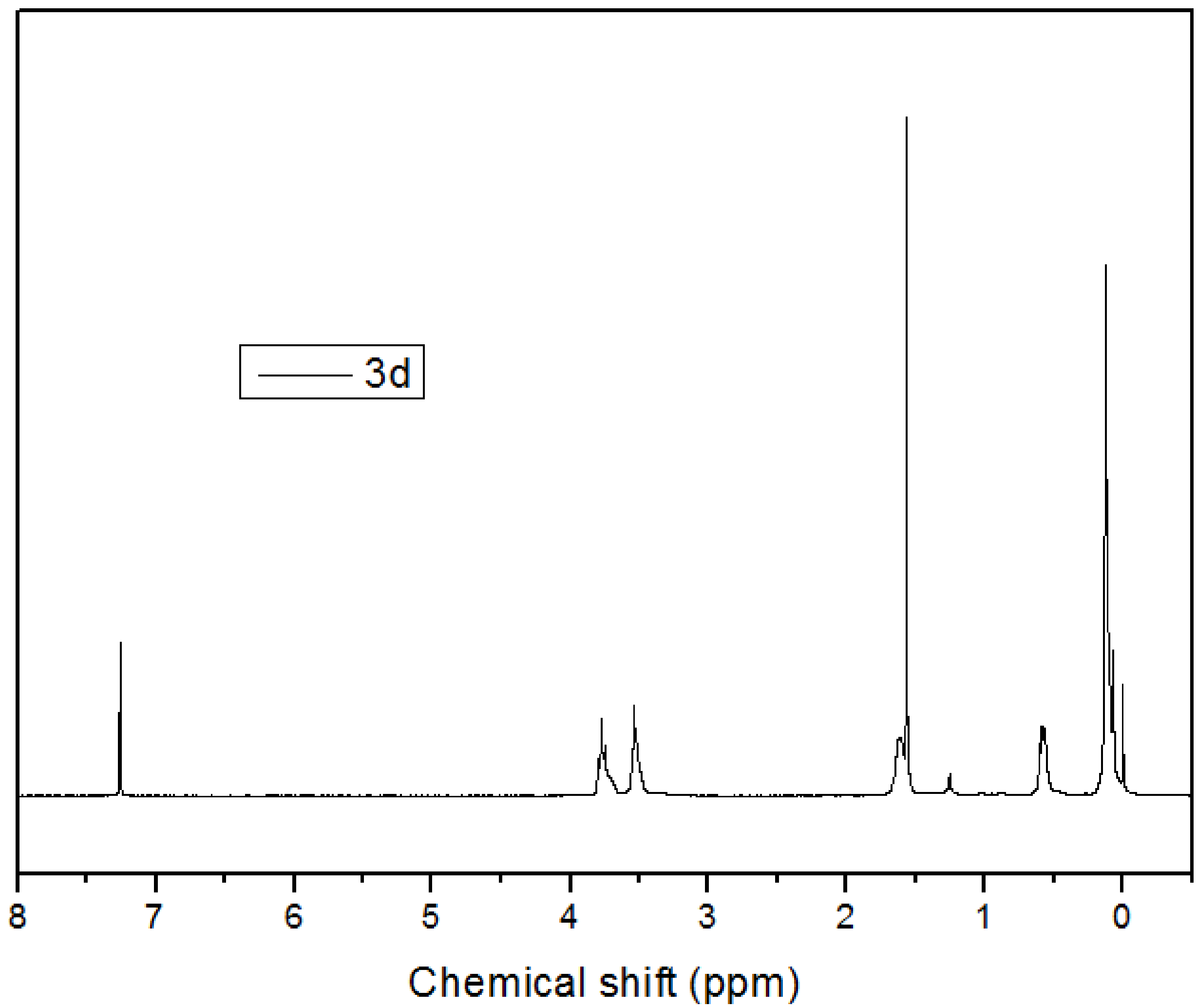

Figure S9: ^{1}H NMR of compound **3d** in $CDCl_3$ at room temperature.

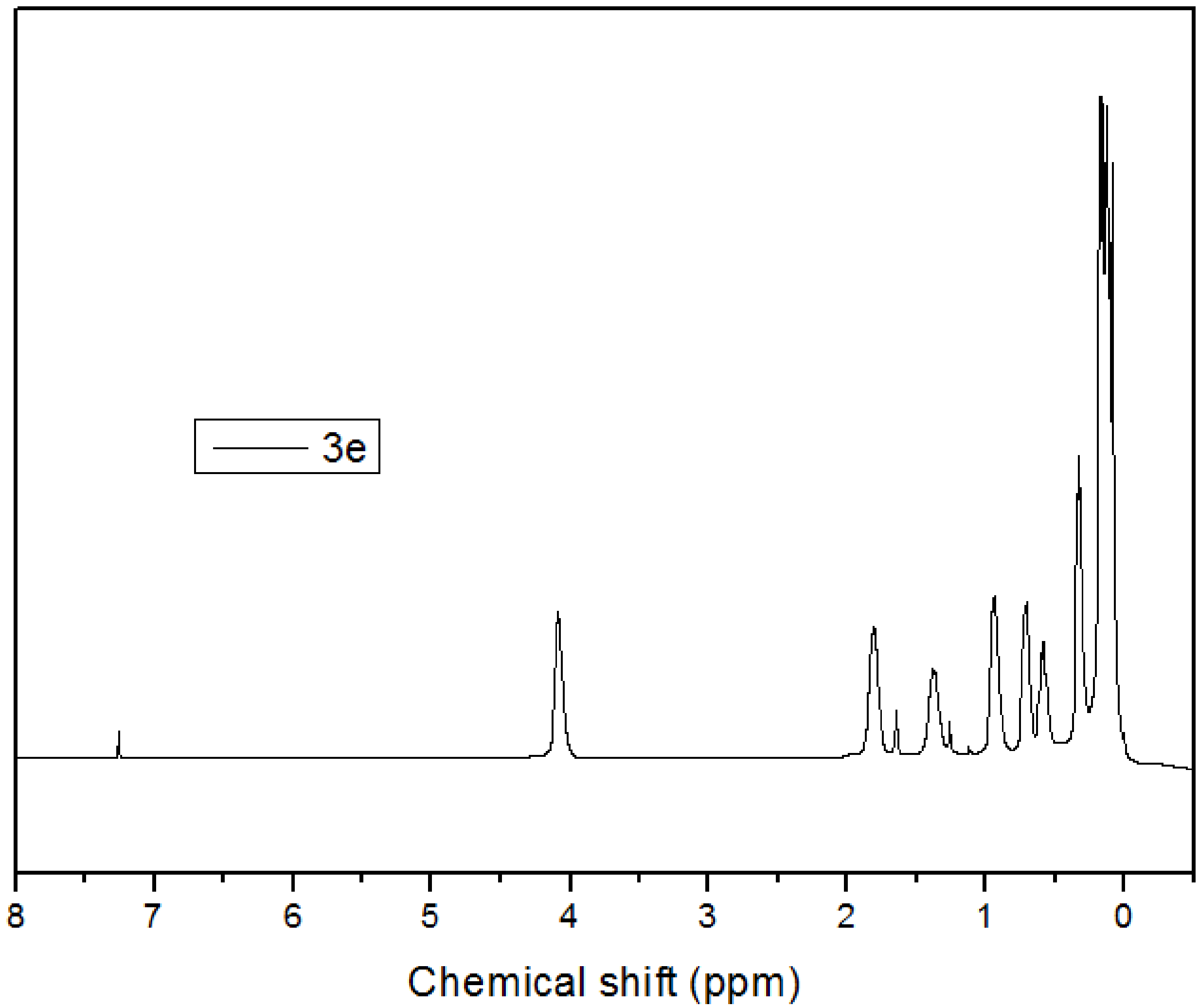

Figure S10: ^{1}H NMR of compound **3e** in $CDCl_3$ at room temperature.

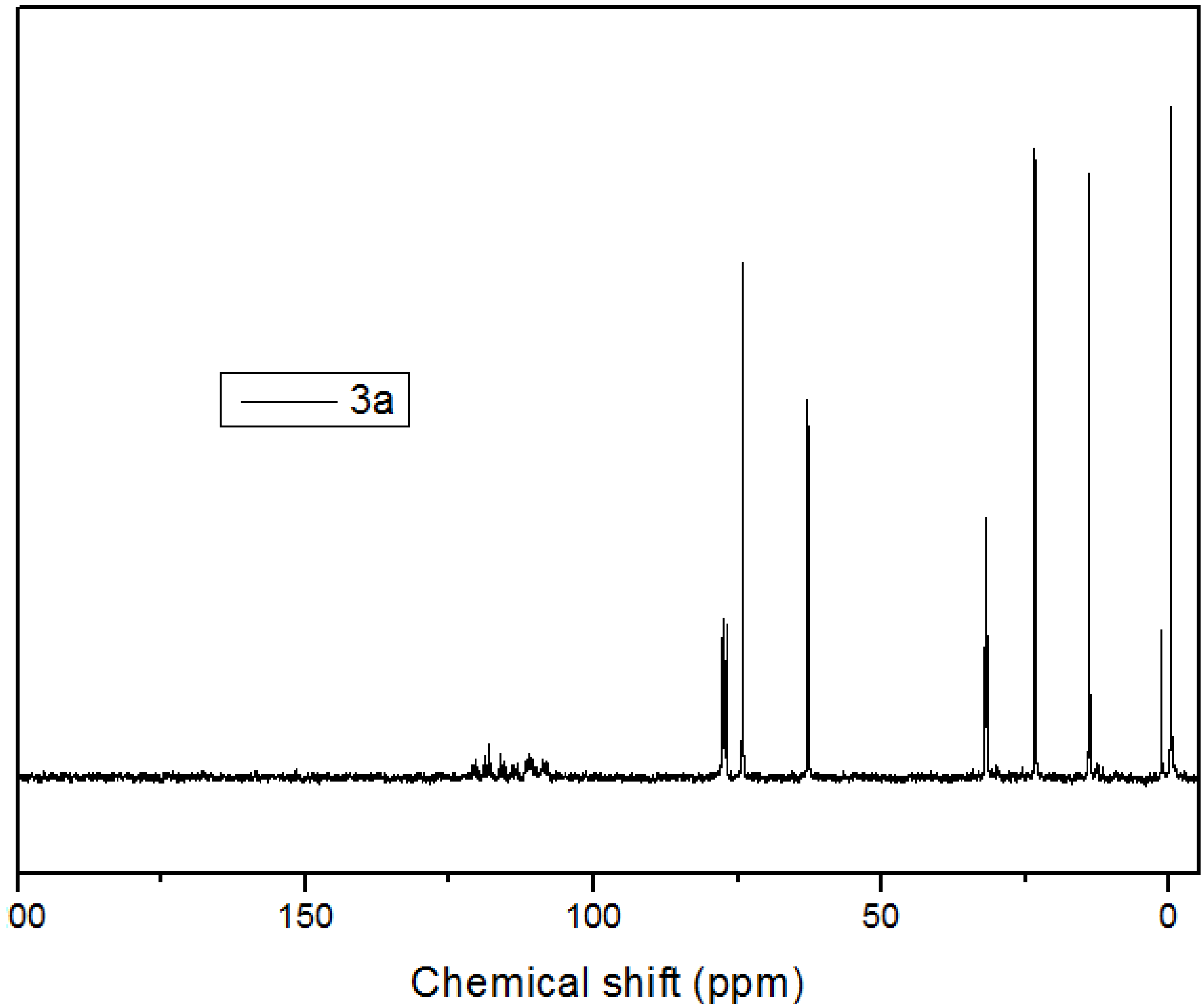

Figure S11: ^{13}C NMR of compound **3a** in $CDCl_3$ at room temperature.

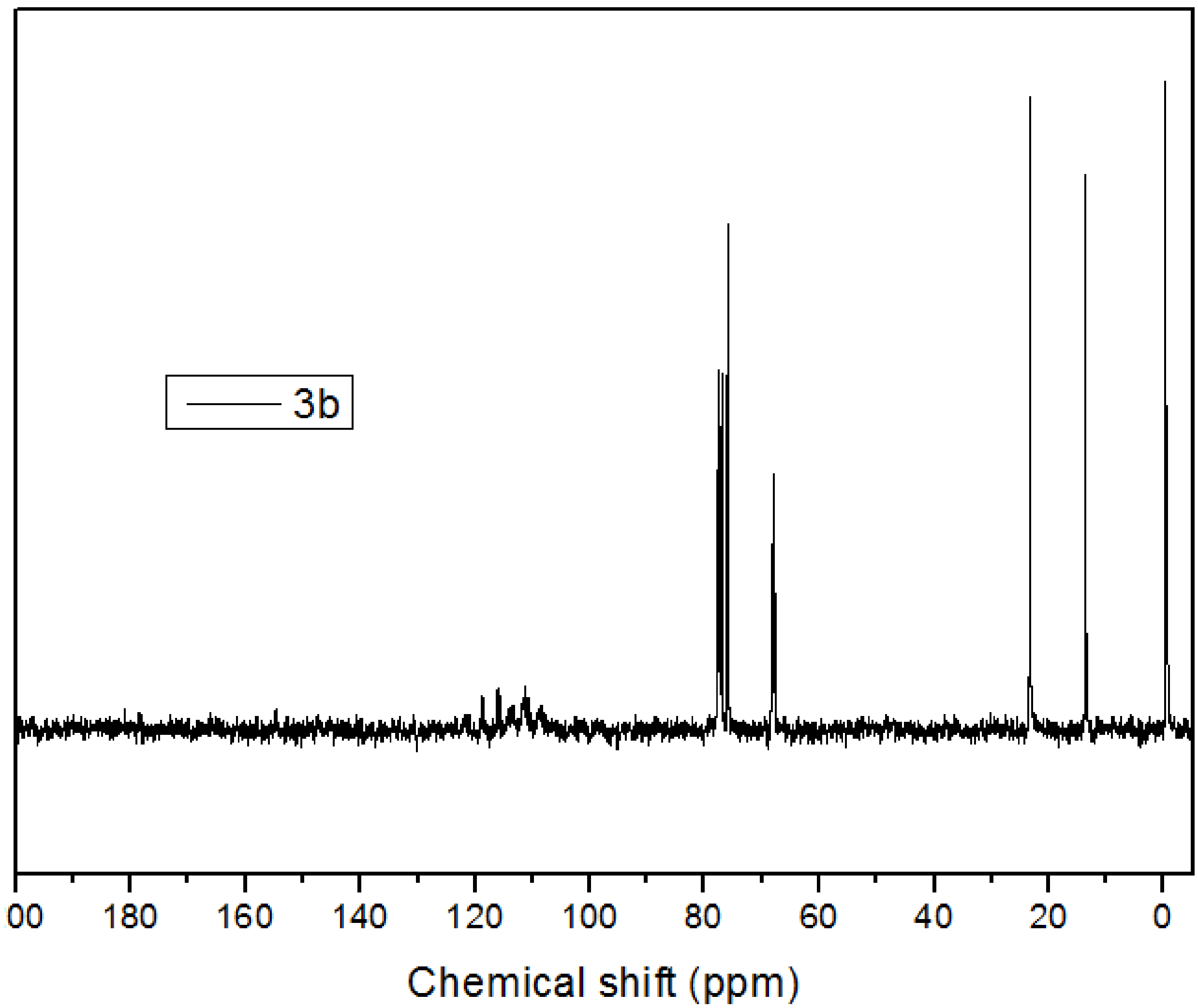

Figure S12: ^{13}C NMR of compound **3b** in $CDCl_3$ at room temperature.

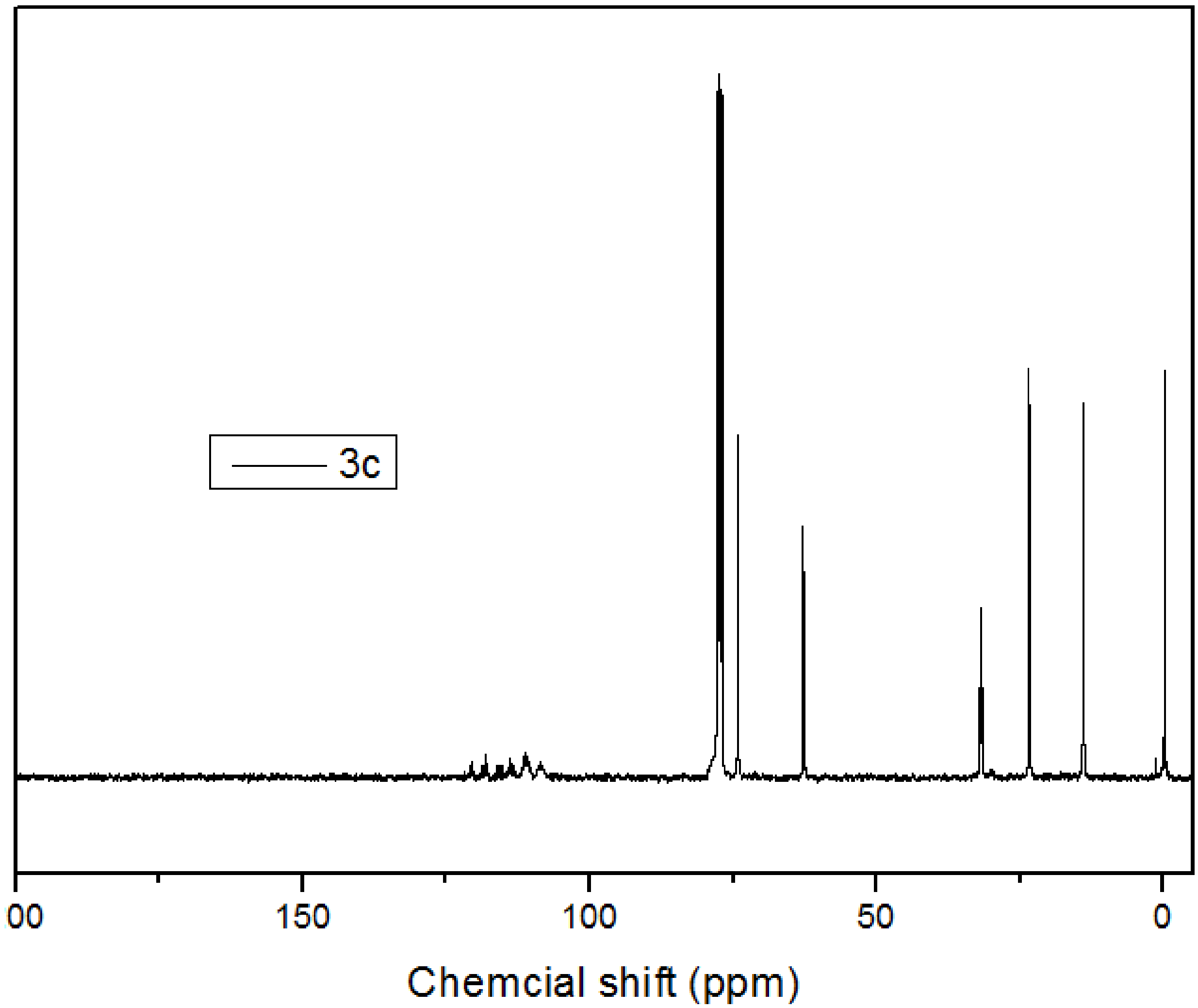

Figure S13: ^{13}C NMR of compound **3c** in $CDCl_3$ at room temperature.

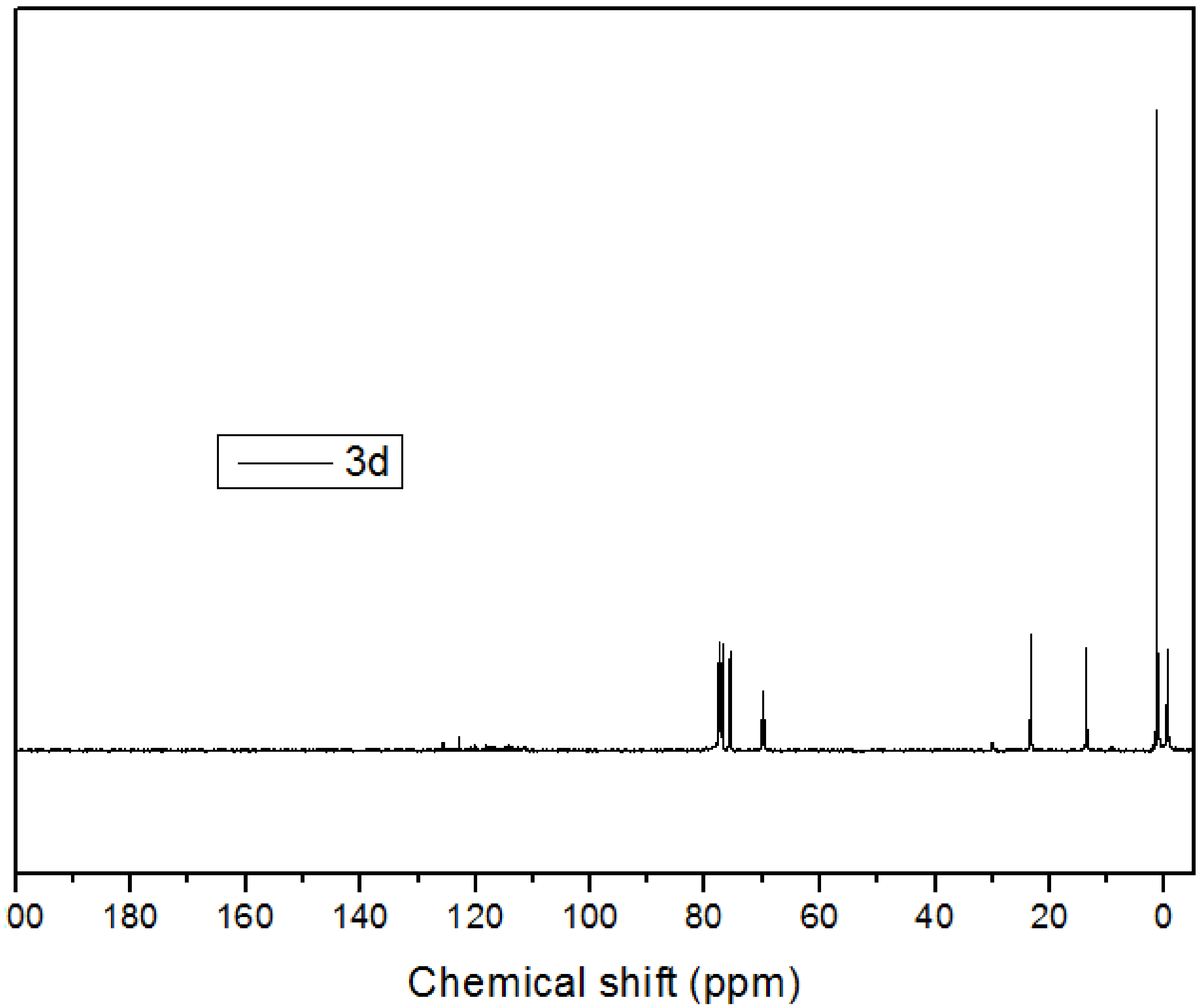

Figure S14: ^{13}C NMR of compound **3d** in $CDCl_3$ at room temperature.

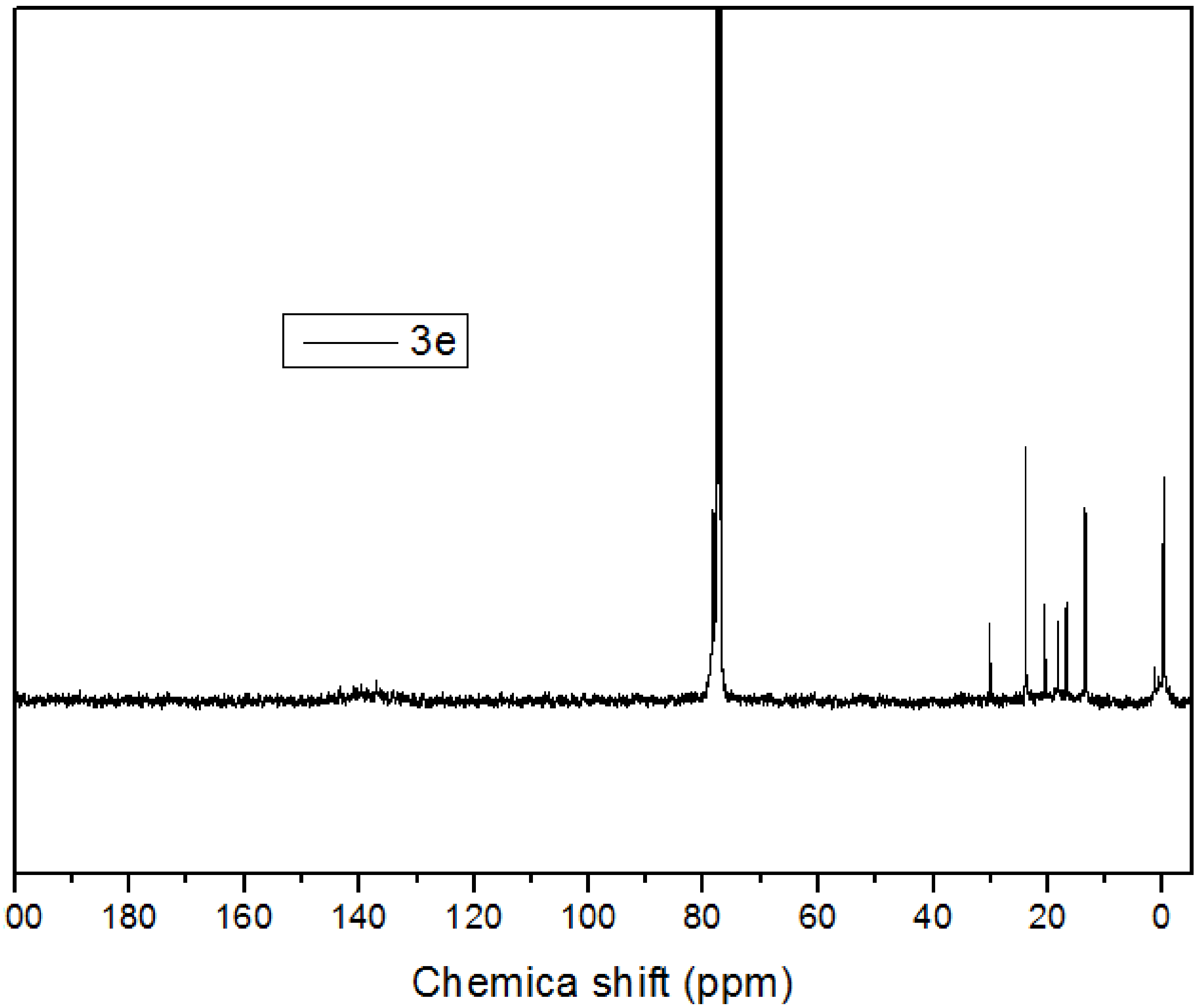

Figure S15: ^{13}C NMR of compound **3e** in $CDCl_3$ at room temperature.

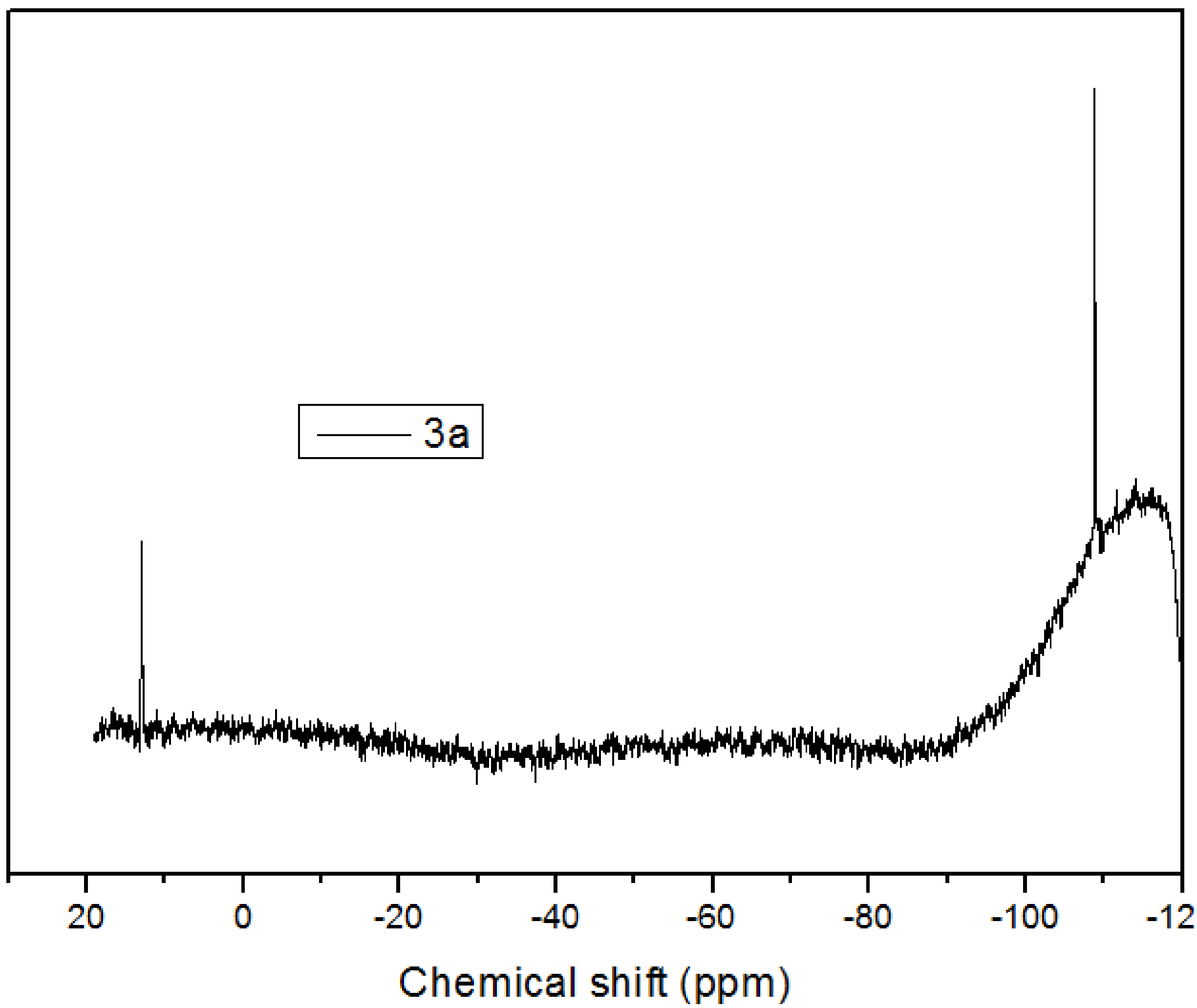

Figure S16: ^{29}Si NMR of compound **3a** in $CDCl_3$ at room temperature.

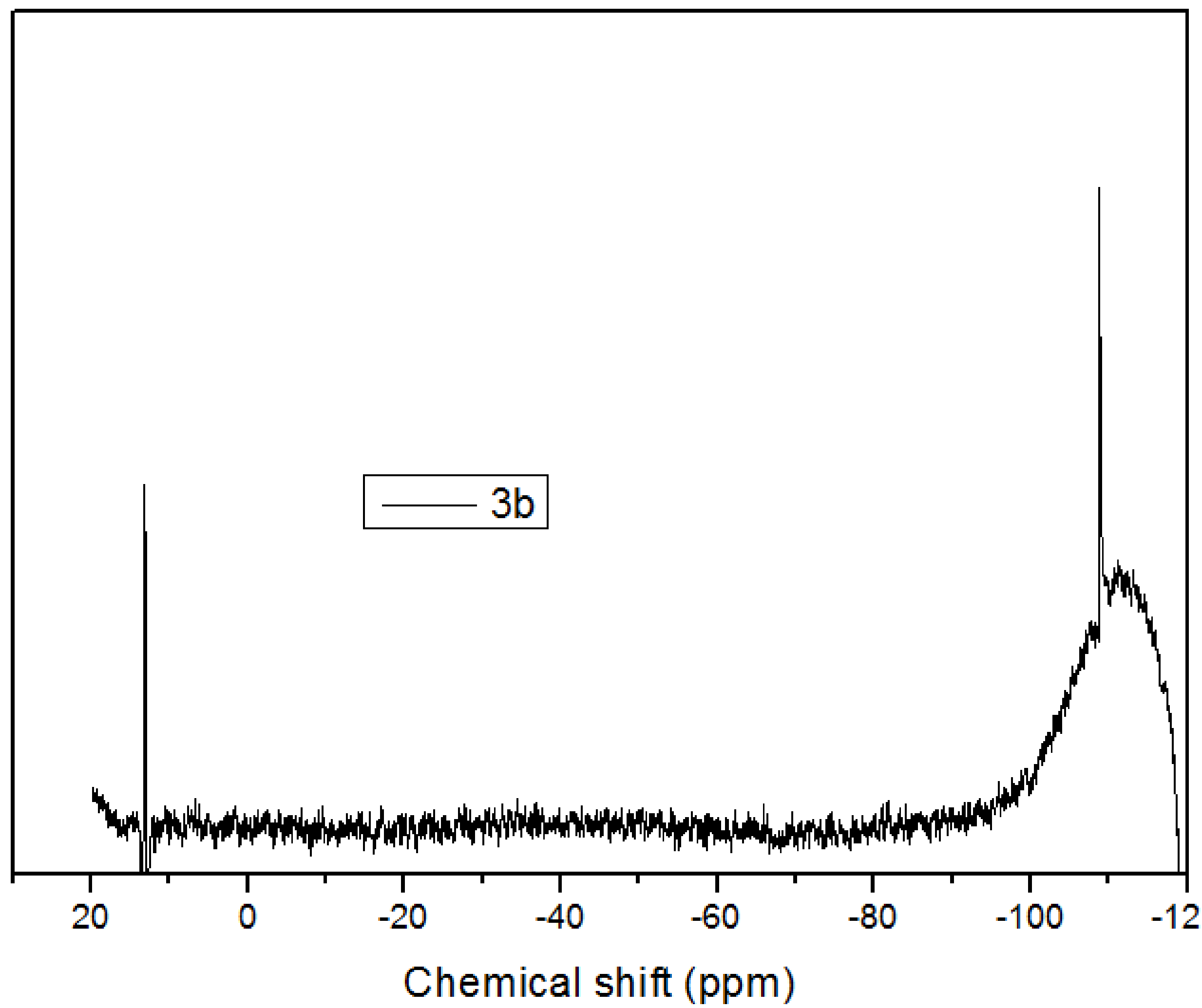

Figure S17: ^{29}Si NMR of compound **3b** in $CDCl_3$ at room temperature.

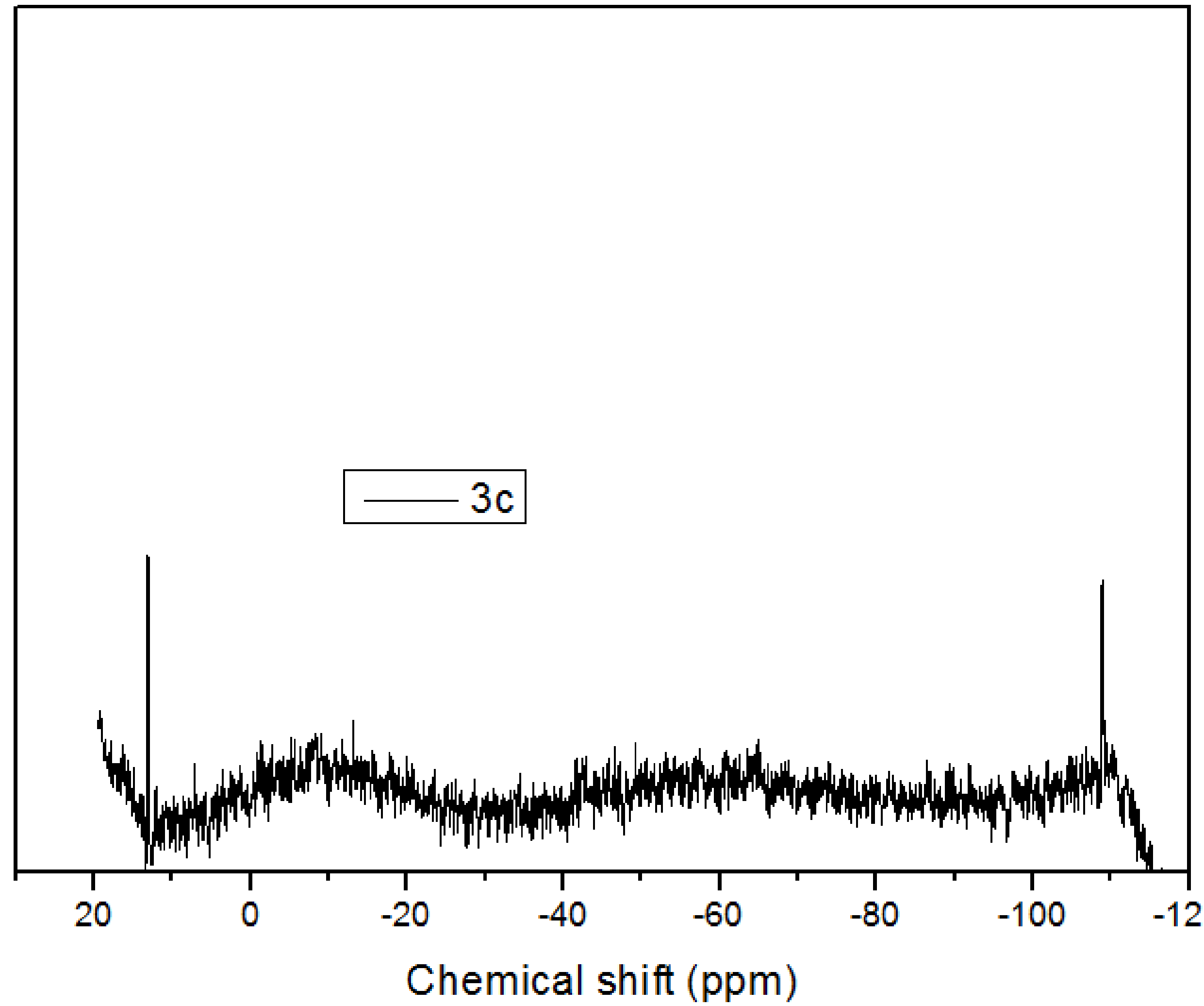

Figure S18: ^{29}Si NMR of compound **3c** in $CDCl_3$ at room temperature.

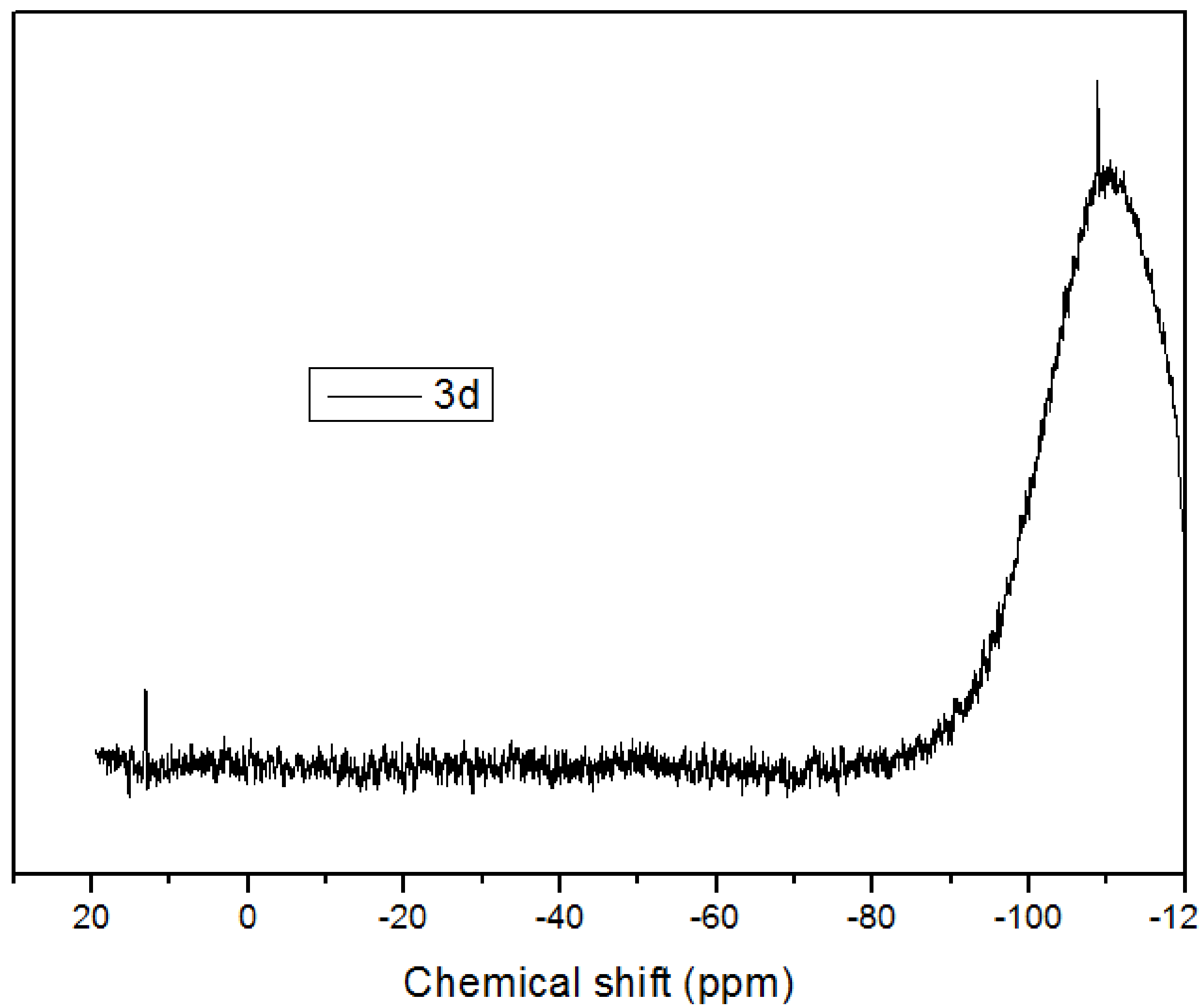

Figure S19: ^{29}Si NMR of compound **3d** in $CDCl_3$ at room temperature.

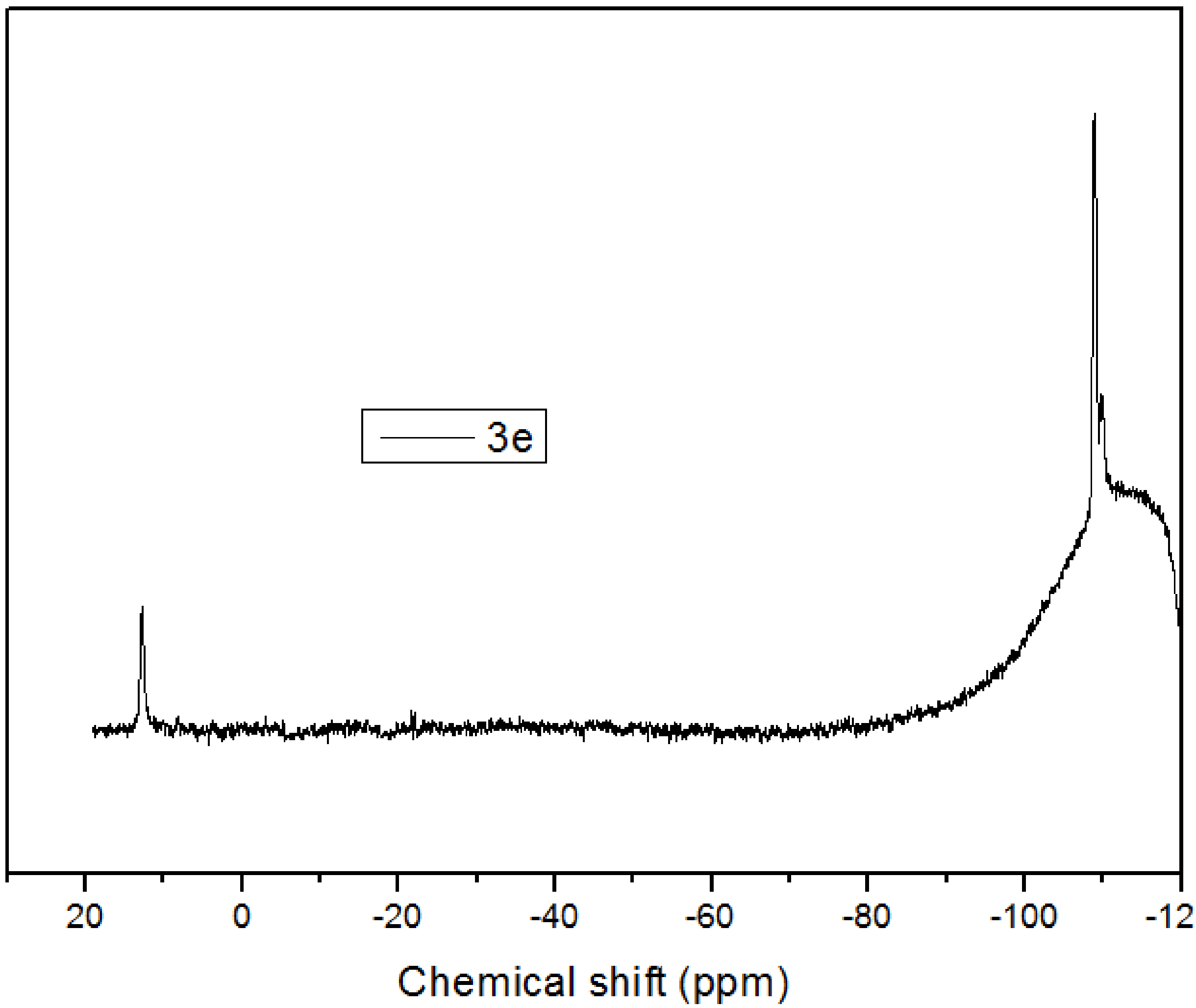

Figure S20: ^{29}Si NMR of compound **3e** in $CDCl_3$ at room temperature.

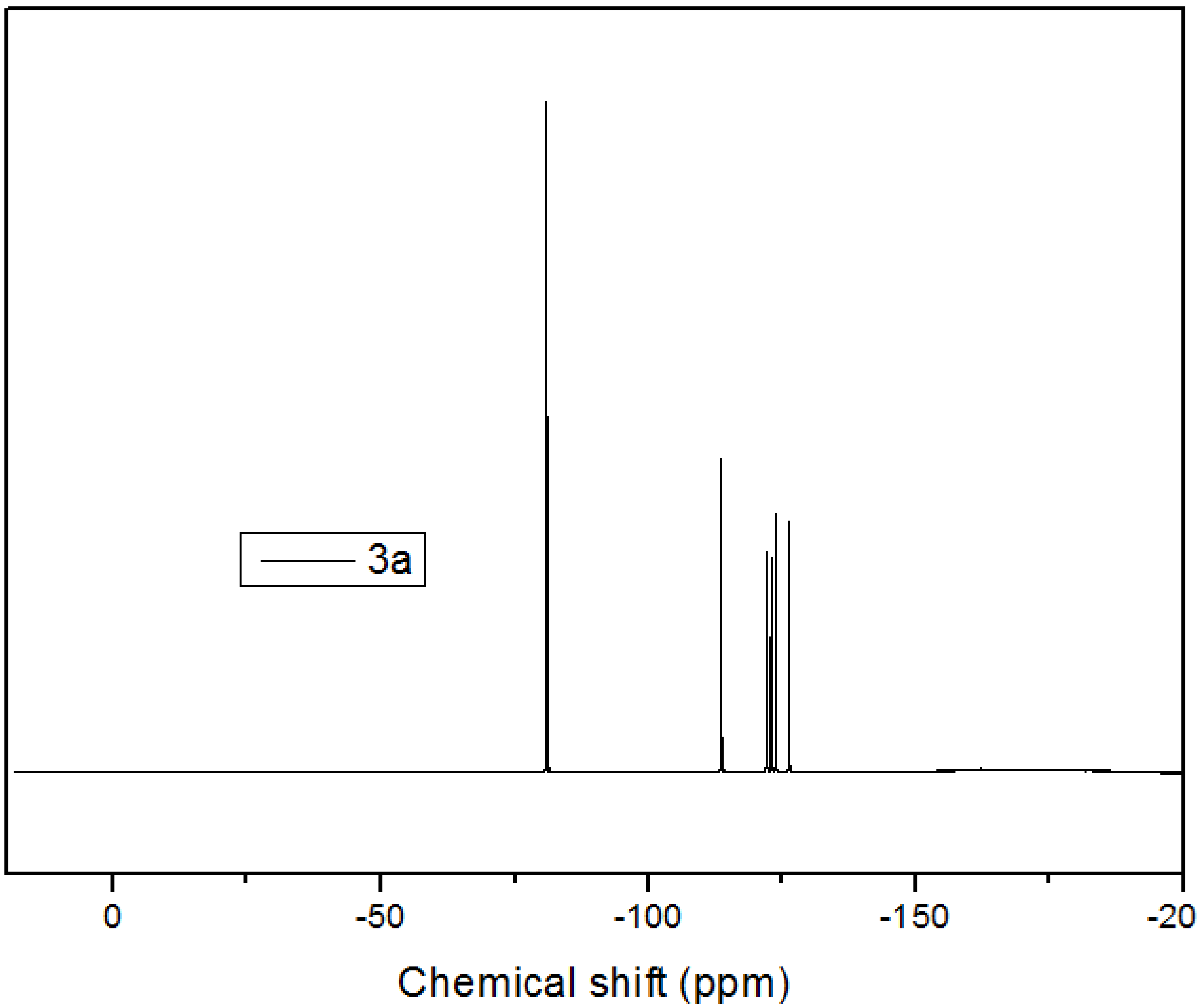

Figure S21: ^{19}F NMR of compound **3a** in $CDCl_3$ at room temperature.

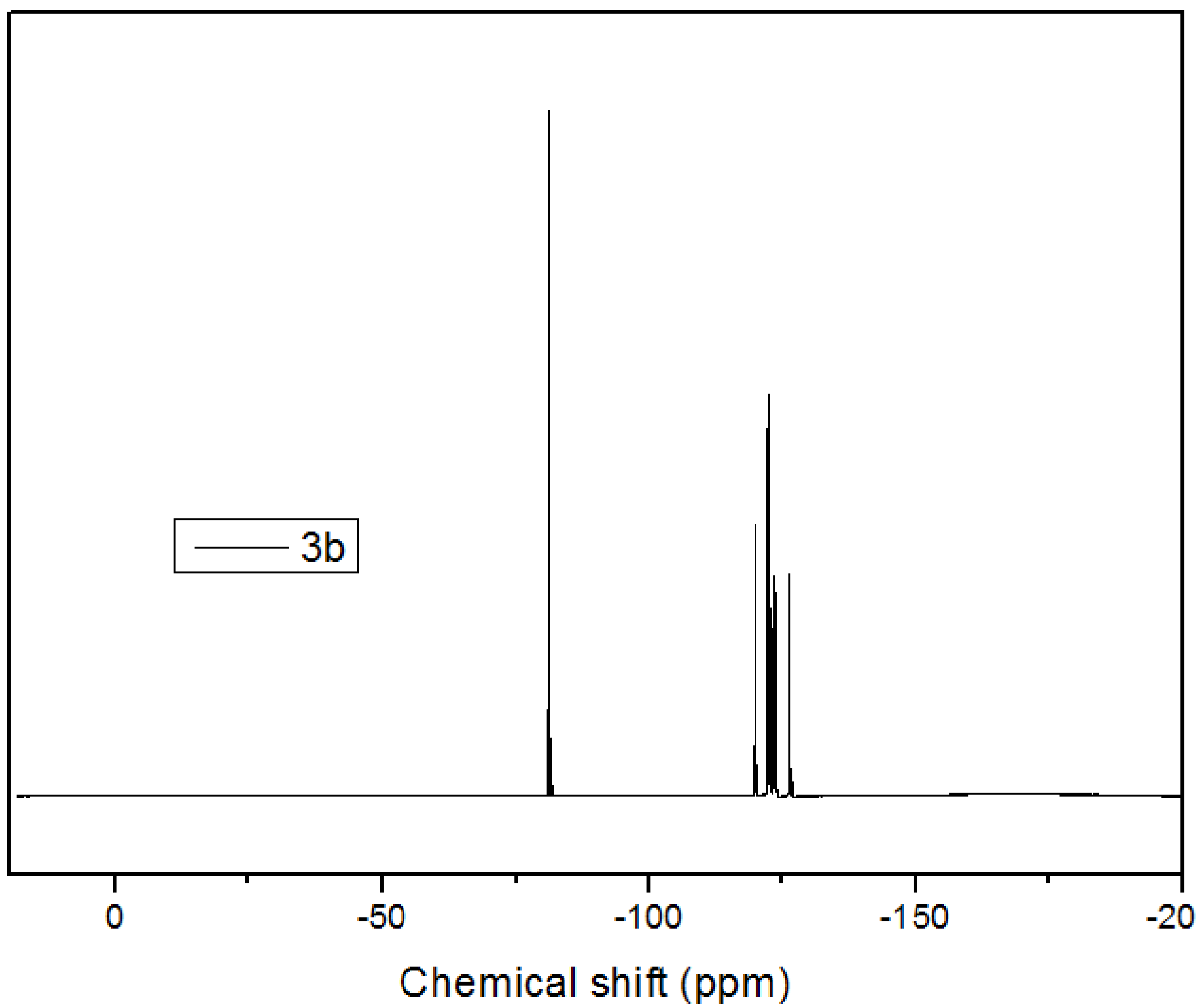

Figure S22: ^{19}F NMR of compound **3b** in $CDCl_3$ at room temperature.

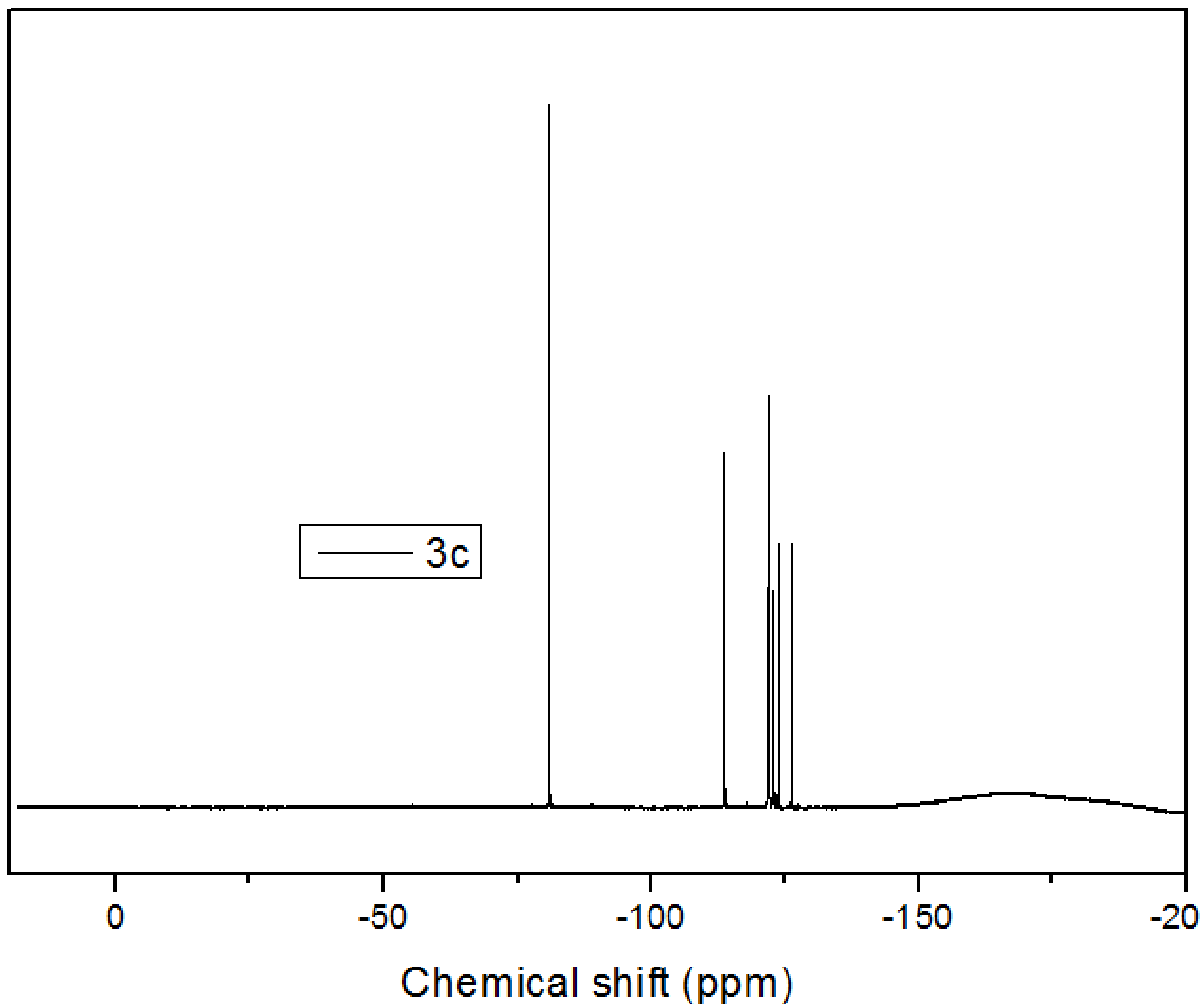

Figure S23: ^{19}F NMR of compound **3c** in $CDCl_3$ at room temperature.

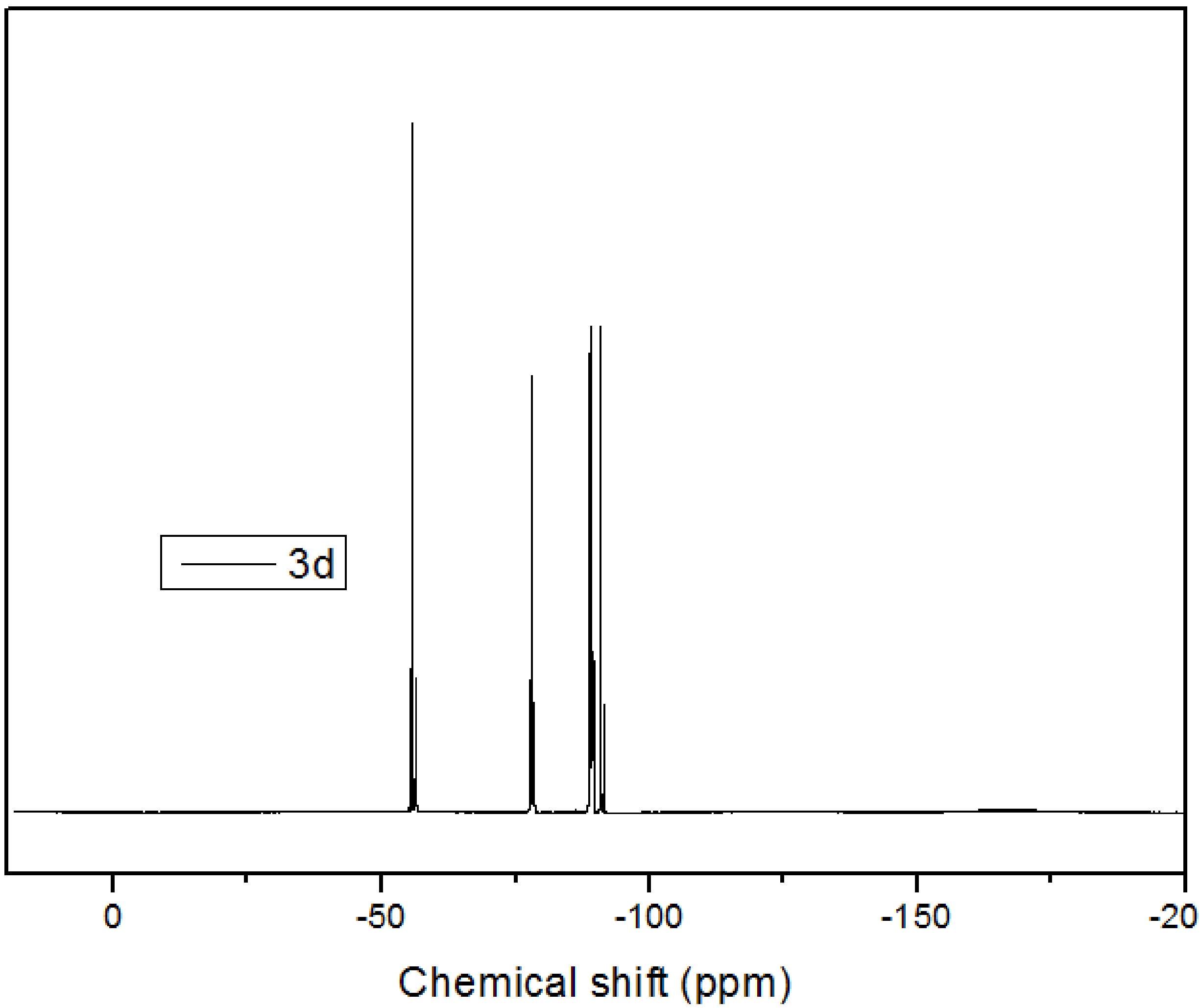

Figure S24: ^{19}F NMR of compound **3d** in $CDCl_3$ at room temperature.

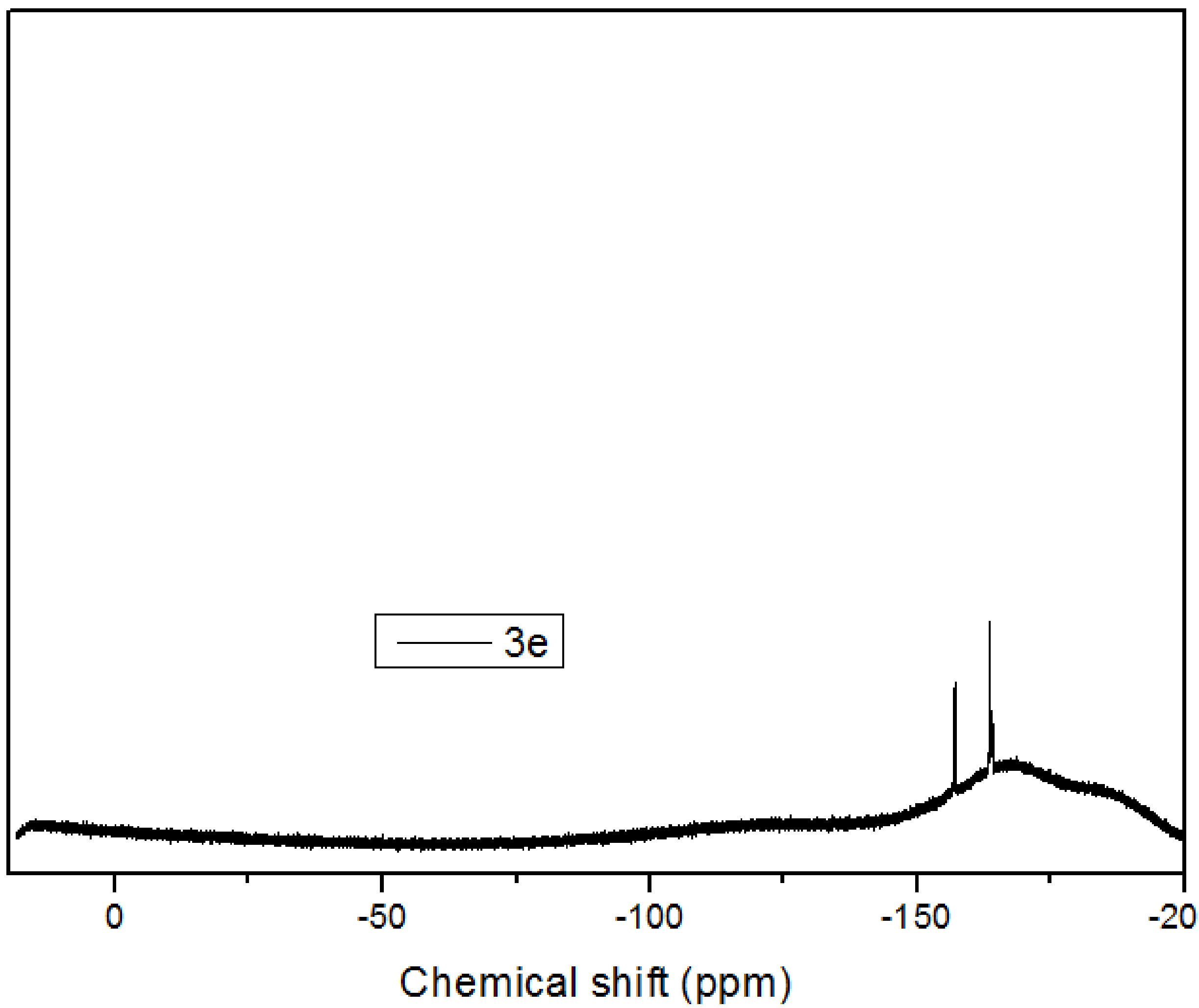

Figure S25: ^{19}F NMR of compound **3e** in $CDCl_3$ at room temperature.