Electronic Supplementary Material (ESI) for RSC Advances.

Fig. S1. IR spectra of DTPAD (A), ^{1}H NMR spectra of DTPAD (B), and ^{13}C NMR spectra of DTPAD (C)

Fig. S2. The UV absorption curves of the chloroplatinic acid solution: (A) Before immobilization, (B)After immobilization of SiO2-DTPA-Pt, (C) After immobilization of SiO_2-NTA-Pt, and (D) After immobilization of SiO_2-SA-Pt

Fig. S3. UV absorption curves of the chloroplatinic acid solution for SiO_2-DTPA-Pt at different temperatures.

Fig. S4. UV absorption curves of the chloroplatinic acid solution for SiO_2-DTPA-Pt at different solvents.

Fig. S5 (A) The GC spectra of 1-hexane hydrosilylation with methyldichlorosilane catalyzed by SiO_2-APCAs-Pt, (B) The ^{1}H NMR spectra of dichloromethylhexylsilane,

Fig. S6 The ^{1}H NMR spectra of the products: (A) dichloromethylheptylsilane; (B) dichloromethyloctylsilane; (C) dichloromethyldecylsilane; (D) dichloromethyldodecylsilane; (E) dichloromethyltetradecylsilane; (F) dichloromethylhexadecylsilane; (G) dichloromethyloctadecylsilane; (H) dichloromethylphenethylsilane; and (I) dichloromethylnorbornylsilane

The ^{1}H NMR spectrum of DTPAD

^{1}H NMR (DMSO, 600MHz) of DTPAD was shown in Fig. S1(B): δ 2.96 (d, 4H, $N-CH_2-\underline{CH_2}-N-\underline{CH_2}-CH_2-N$), 3.15 (s, 4H, $N-\underline{CH_2}-CH_2-N-CH_2-\underline{CH_2}-N$), 3.47 (s, 8H, $O{=}C\underline{CH_2}N$), 3.75 (s, 2H, $N-\underline{CH_2}$). ^{13}C NMR (DMSO, 600MHz) was shown in Fig. S1(C): δ 49.47 ($N-CH_2-\underline{CH_2}-N-\underline{CH_2}-CH_2-N$); 51.48 ($N-\underline{CH_2}-CH_2-N-CH_2-\underline{CH_2}-N$); 54.63 ($N-\underline{CH_2}-COOH$); 54.81 ($O{=}C\underline{CH_2}N$); 168.90 ($\underline{O{=}C}CH_2N$); 172.57 ($N-CH_2-\underline{COOH}$). These NMR data were consisted with the characteristic peaks of DTPAD.

The ^{1}H NMR spectrum of the hydrosilylation products:

The ^{1}HNMR data of the product for 1-hexene (see Fig. S5B) was as follows: 0.77 (s, 3H, $\underline{CH_3}-SiCl_2-$), 0.89 (t, 3H, $CH_3-SiCl_2-CH_2-CH_2-CH_2-(CH_2)_2-\underline{CH_3}$), 1.12 (t, 2H, $CH_3-SiCl_2-\underline{CH_2}-$), 1.30 (m, 4H, $CH_3-SiCl_2-CH_2-\underline{(CH_2)_2}-CH_2-CH_2-$), 1.38 (m, 2H, $CH_3-SiCl_2-(CH_2)_3-\underline{CH_2}-CH_2-$), 1.50 (m, 2H, $CH_3-SiCl_2-(CH_2)_4-\underline{CH_2}-$), respectively. These data verified the reaction product was dichloromethylhexylsilane

The product of 1-heptene is dichloromethylheptylsilane, whose ^{1}H NMR spectrum (see Fig. S6A) agreed with that of stand dichloromethylheptylsilane (as the predicted NMR data calculated using ACD/Labs Software V11.01). There are six group peaks, which are 0.77 (t, 3H, $\underline{CH_3}-SiCl_2-$), 0.89 (t, 3H, $CH_3-SiCl_2-(CH_2)_6-\underline{CH_3}$), 1.12 (t, 2H, $CH_3-SiCl_2-\underline{CH_2}-$), 1.30 (m, 6H, $CH_3-SiCl_2-CH_2-\underline{(CH_2)_3}-$), 1.38 (m, 2H, $CH_3-SiCl_2-(CH_2)_4-\underline{CH_2}-$), 1.50 (m, 2H, $CH_3-SiCl_2-(CH_2)_5-\underline{CH_2}-$). In GC, dichloromethylheptylsilane appeared at 12.828 min, which is separated well from 1-heptene at 4.734 min.

The product of 1-octene is dichloromethyloctylsilane, whose ^{1}H NMR spectrum (see Fig. S6B) agreed with that of stand dichloromethyloctylsilane (Data were obtained from the National Institute of Advanced Industrial Science and Technology). There are six group peaks, which are 0.77 (s, 3H, $\underline{CH_3}-SiCl_2-$), 0.88 (t, 3H, $CH_3-SiCl_2-(CH_2)_7-\underline{CH_3}$), 1.11 (t, 2H, $CH_3-SiCl_2-\underline{CH_2}-$), 1.35 (m, 10H, $CH_3-SiCl_2-CH_2-\underline{(CH_2)_5}-$), 1.50 (m, 2H, $CH_3-SiCl_2-(CH_2)_6-\underline{CH_2}-$). In GC, dichloromethyloctylsilane appeared at 16.212 min, which is separated well from 1-heptene at 5.825 min.

The product of 1-decene is dichlorodecylmethylsilane, whose ^{1}H NMR spectrum (see Fig. S6C) agreed with that of stand dichlorodecylmethylsilane (Data were obtained from the National Institute of Advanced Industrial Science and Technology). There are six group peaks, which are 0.77 (t, 3H, $\underline{CH_3}$-$SiCl_2$-), 0.89 (t, 3H, CH_3-$SiCl_2$-$(CH_2)_9$-$\underline{CH_3}$), 1.12 (t, 2H, CH_3-$SiCl_2$-$\underline{CH_2}$-), 1.30 (m, 12H, CH_3-$SiCl_2$-CH_2-$\underline{(CH_2)_6}$-), 1.36 (m, 2H, CH_3-$SiCl_2$-$(CH_2)_7$-$\underline{CH_2}$-), 1.48 (m, 2H, CH_3-$SiCl_2$-$(CH_2)_8$-$\underline{CH_2}$-). In GC, dichlorodecylmethylsilane appeared at 19.693 min, which is separated well from 1-decene at 6.643 min.

The product of 1-dodecene is dichlorododecylmethylsilane, whose ^{1}H NMR spectrum (see Fig. S6D) agreed with that of stand dichlorododecylmethylsilane (Data were obtained from the National Institute of Advanced Industrial Science and Technology). There are six group peaks, which are 0.76 (t, 3H, $\underline{CH_3}$-$SiCl_2$-), 0.88 (t, 3H, CH_3-$SiCl_2$-$(CH_2)_{11}$-$\underline{CH_3}$), 1.11 (t, 2H, CH_3-$SiCl_2$-$\underline{CH_2}$-), 1.26 (m, 16H, CH_3-$SiCl_2$-CH_2-$\underline{(CH_2)_8}$-), 1.36 (m, 2H, CH_3-$SiCl_2$-$(CH_2)_9$-$\underline{CH_2}$-), 1.49 (m, 2H, CH_3-$SiCl_2$-$(CH_2)_{10}$-$\underline{CH_2}$-). In GC, dichlorododecylmethylsilane appeared at 20.017 min, which is separated well from 1-dodecene at 13.546 min.

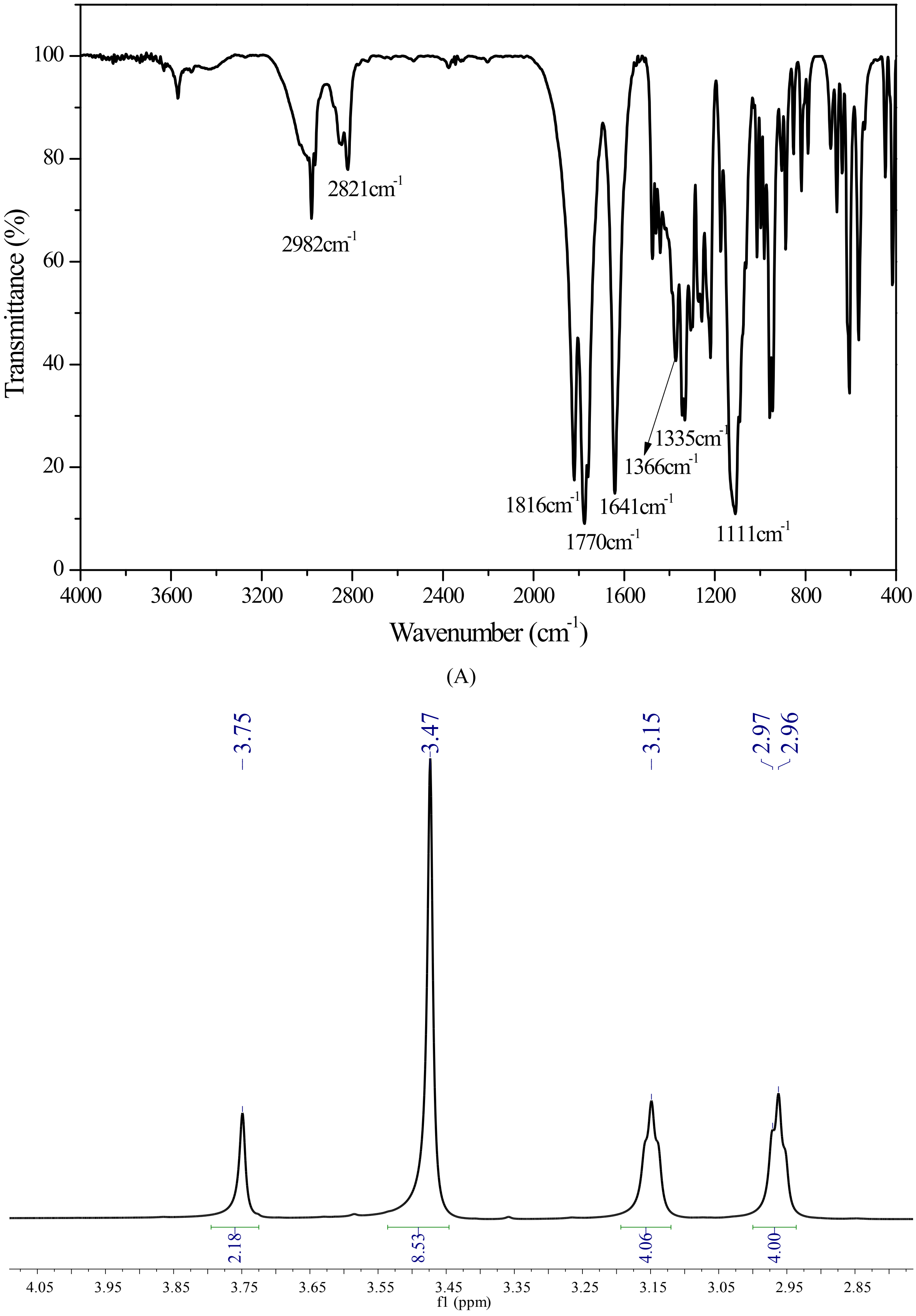
The product of 1-tetradecylene is dichloromethyltetradecylsilane, whose ^{1}H NMR spectrum (see Fig. S6E) agreed with that of stand dichloromethyltetradecylsilane (Data were obtained from the National Institute of Advanced Industrial Science and Technology). There are six group peaks, which are 0.77 (t, 3H, $\underline{CH_3}$-$SiCl_2$-), 0.89 (t, 3H, CH_3-$SiCl_2$-$(CH_2)_{13}$-$\underline{CH_3}$), 1.12 (t, 2H, CH_3-$SiCl_2$-$\underline{CH_2}$-), 1.27 (m, 20H, CH_3-$SiCl_2$-CH_2-$\underline{(CH_2)_{10}}$-), 1.38 (m, 2H, CH_3-$SiCl_2$-$(CH_2)_{11}$-$\underline{CH_2}$-), 1.49 (m, 2H, CH_3-$SiCl_2$-$(CH_2)_{12}$-$\underline{CH_2}$-). In GC, dichloromethyltetradecylsilane appeared at 24.117 min, which is separated well from 1-tetradecylene at 16.809 min.

The product of 1-hexadecene is dichloromethylhexadecylsilane, whose ^{1}H NMR spectrum (see Fig. S6F) agreed with that of stand dichloromethylhexadecylsilane (Data were obtained from the National Institute of Advanced Industrial Science and Technology). There are six group peaks, which are 0.76 (t, 3H, $\underline{CH_3}$-$SiCl_2$-), 0.88 (t, 3H, CH_3-$SiCl_2$-$(CH_2)_{15}$-$\underline{CH_3}$), 1.11 (t, 2H, CH_3-$SiCl_2$-$\underline{CH_2}$-), 1.26 (m, 24H, CH_3-$SiCl_2$-CH_2-$\underline{(CH_2)_{12}}$-), 1.36 (m, 2H, CH_3-$SiCl_2$-$(CH_2)_{13}$-$\underline{CH_2}$-), 1.50 (m, 2H, CH_3-$SiCl_2$-$(CH_2)_{14}$-$\underline{CH_2}$-). In GC, dichloromethylhexadecylsilane appeared at 26.615 min, which is separated well from 1-hexadecene at 19.545 min.

The product of 1-octadecene is dichloromethyloctadecylsilane, whose ^{1}H NMR spectrum (see Fig. S6G) agreed with that of stand dichloromethyloctadecylsilane (Data were obtained from the National Institute of Advanced Industrial Science and Technology). There are six group peaks, which are 0.69 (t, 3H, $\underline{CH_3}$-$SiCl_2$-), 0.82 (t, 3H, CH_3-$SiCl_2$-$(CH_2)_{17}$-$\underline{CH_3}$), 1.04 (t, 2H, $\mathrm{CH_3\text{-}SiCl_2\text{-}\underline{CH_2}\text{-}}$), 1.18 (m, 28H, $\mathrm{CH_3\text{-}SiCl_2\text{-}CH_2\text{-}\underline{(CH_2)_{14}}\text{-}}$), 1.30 (m, 2H, $\mathrm{CH_3\text{-}SiCl_2\text{-}(CH_2)_{15}\text{-}\underline{CH_2}\text{-}}$), 1.43 (m, 2H, $\mathrm{CH_3\text{-}SiCl_2\text{-}(CH_2)_{16}\text{-}\underline{CH_2}\text{-}}$). In GC, 1-octadecylmethyldichlorosilane appeared at 32.092 min, which is separated well from 1-octadecene at 23.088 min.

The product of styrene is dichloromethylphenethylsilane, whose ^{1}H NMR spectrum (see Fig. S6H) agreed with that of stand dichloromethylphenethylsilane [45]. There are five group peaks, 0.77(s, 3H, $\mathrm{\underline{CH_3}\text{-}SiCl_2\text{-}}$), 1.50(t，2H, $\mathrm{CH_3\text{-}SiCl_2\text{-}\underline{CH_2}\text{-}}$), 2.84(t, 2H, $\mathrm{CH_3\text{-}SiCl_2\text{-}CH_2\text{-}\underline{CH_2\text{-}}}$), and 7.26(m，5H, $\mathrm{CH_3\text{-}SiCl_2\text{-}(CH_2)_2\text{-}\underline{ph}}$). In GC, dichloromethylphenethylsilane appeared at 16.267 min, which is separated well from styrene at 7.277 min.

Norbornene and cyclohexene were applied to test the catalytic activity of these three immobilized Pt catalysts for ring type alkenes. The ^{1}H NMR spectrum of the product, dichloromethylnorbornylsilane (agreed with the predicted NMR data calculated using ACD/Labs Software V11.01), was shown in Fig. S6I. ^{1}H NMR ($\mathrm{CDCl_3}$) δ: 0.65 (t, 3H), 1.01 (t, 1H), 1.16 (m, 3H), 1.33 (d, 1H), 1.48 (m, 4H), 2.27 (s, 1H).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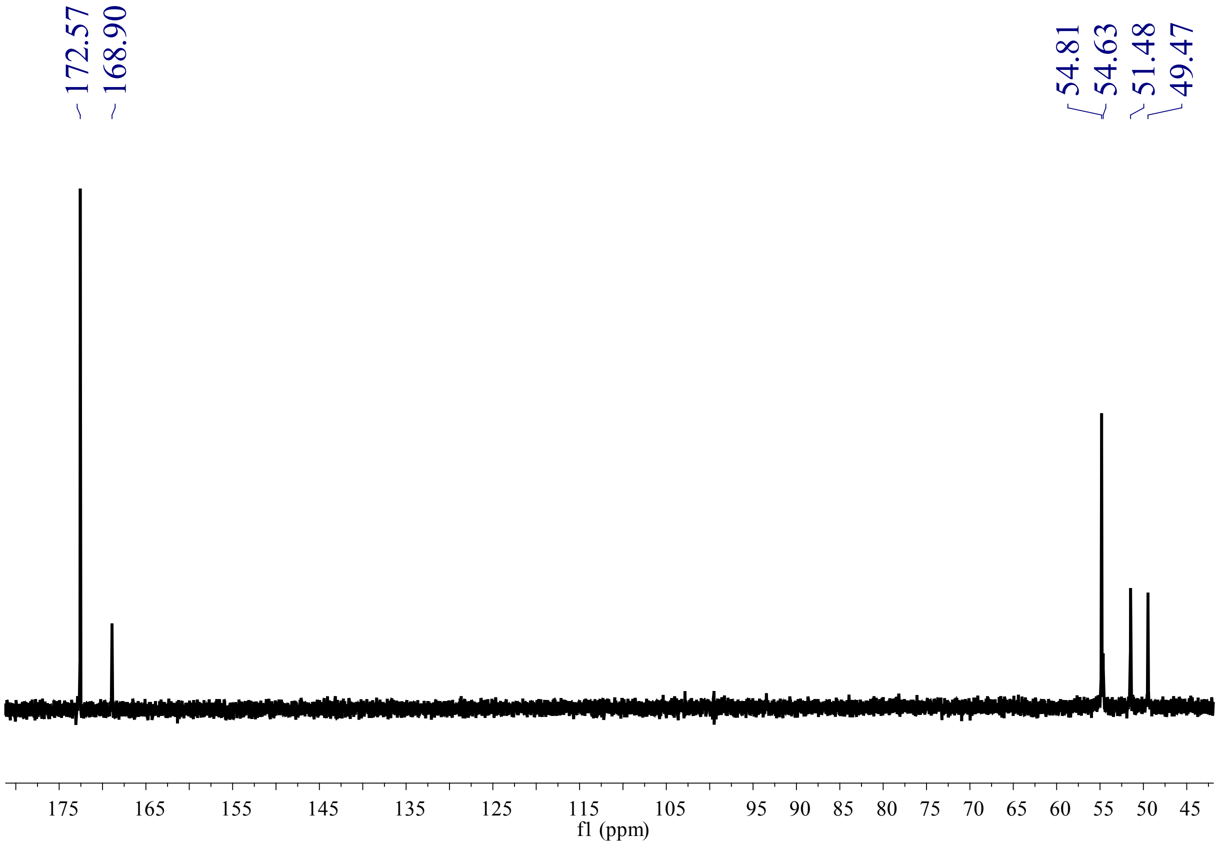
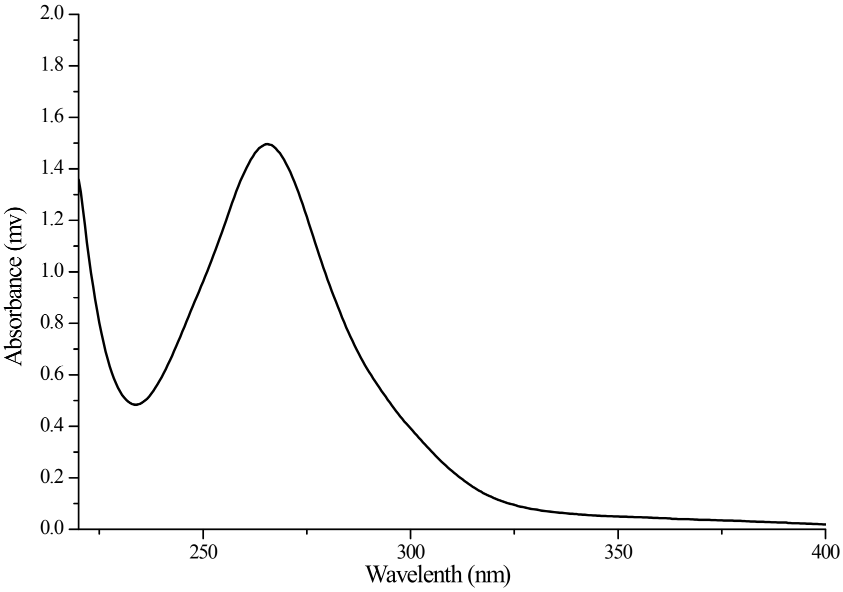
(A)

(B)



(C)

Fig. S1. IR spectra of DTPAD (A), ^{1}H NMR spectra of DTPAD (B), and ^{13}C NMR spectra of DTPAD (C)



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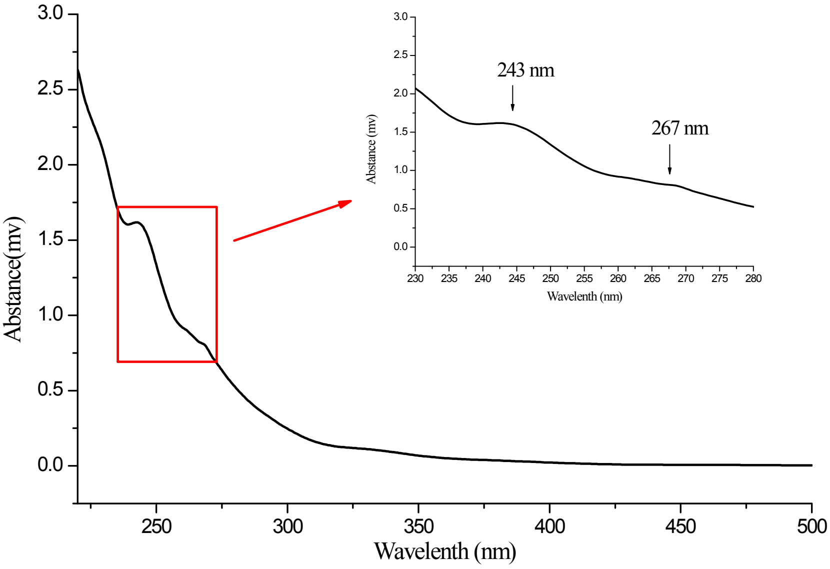

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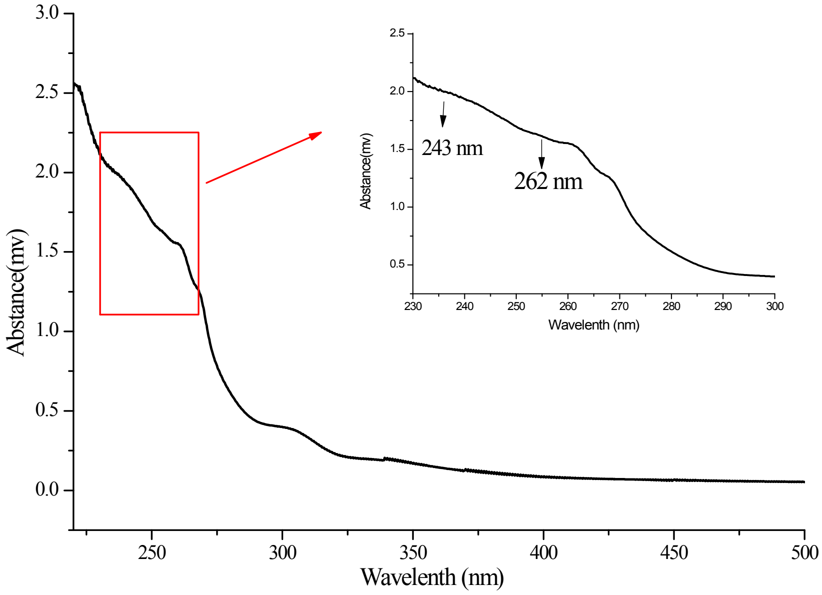

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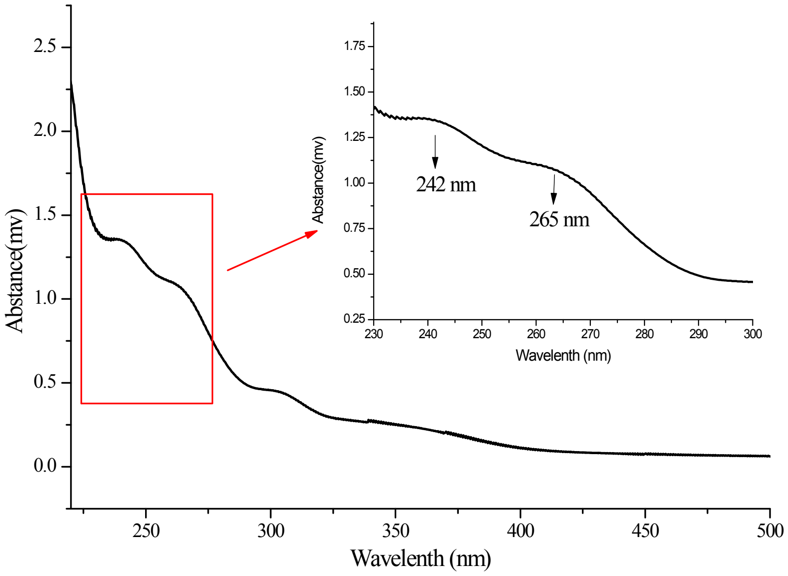
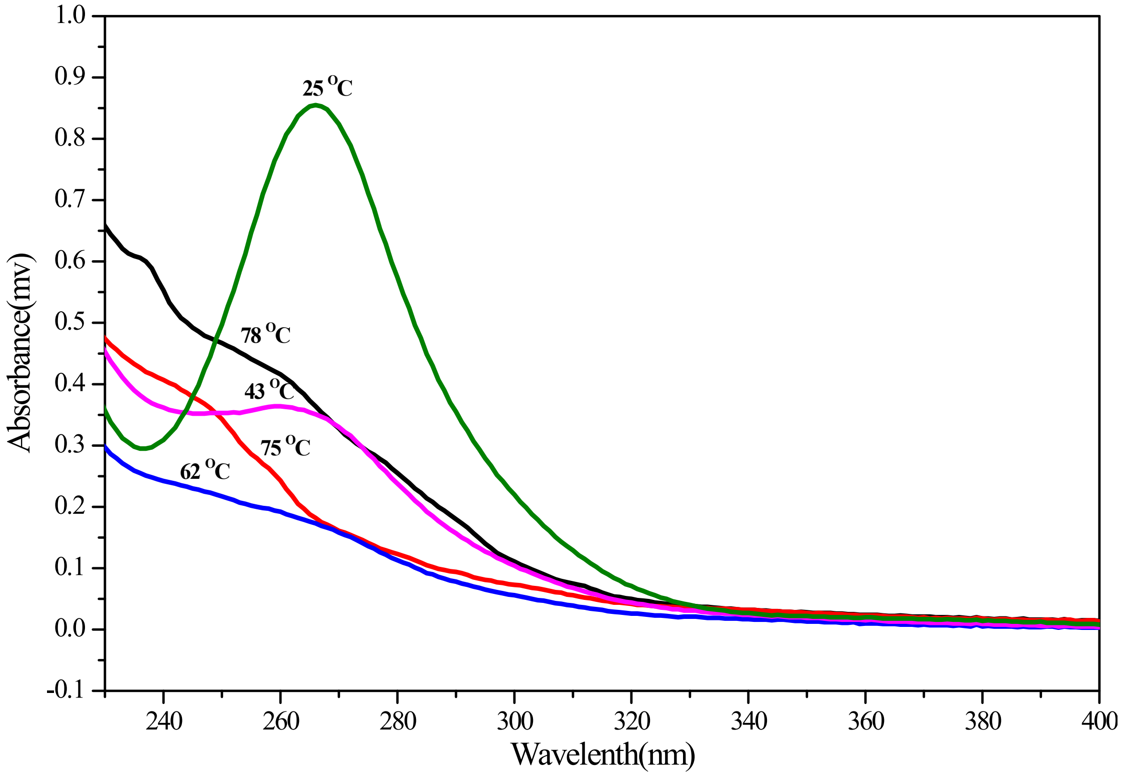
(C)



(D)

Fig. S2. The UV absorption curves of the chloroplatinic acid solution: (A) Before immobilization, (B)After immobilization of SiO_2-DTPA-Pt, (C) After immobilization of SiO_2-NTA-Pt, and (D) After immobilization of SiO_2-SA-Pt.



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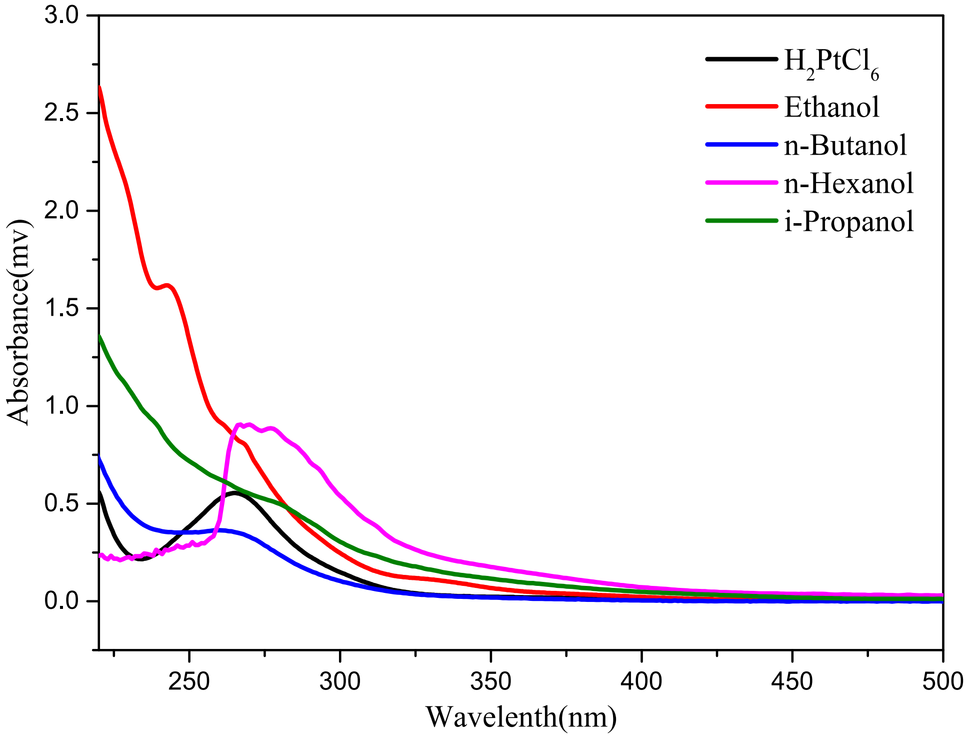
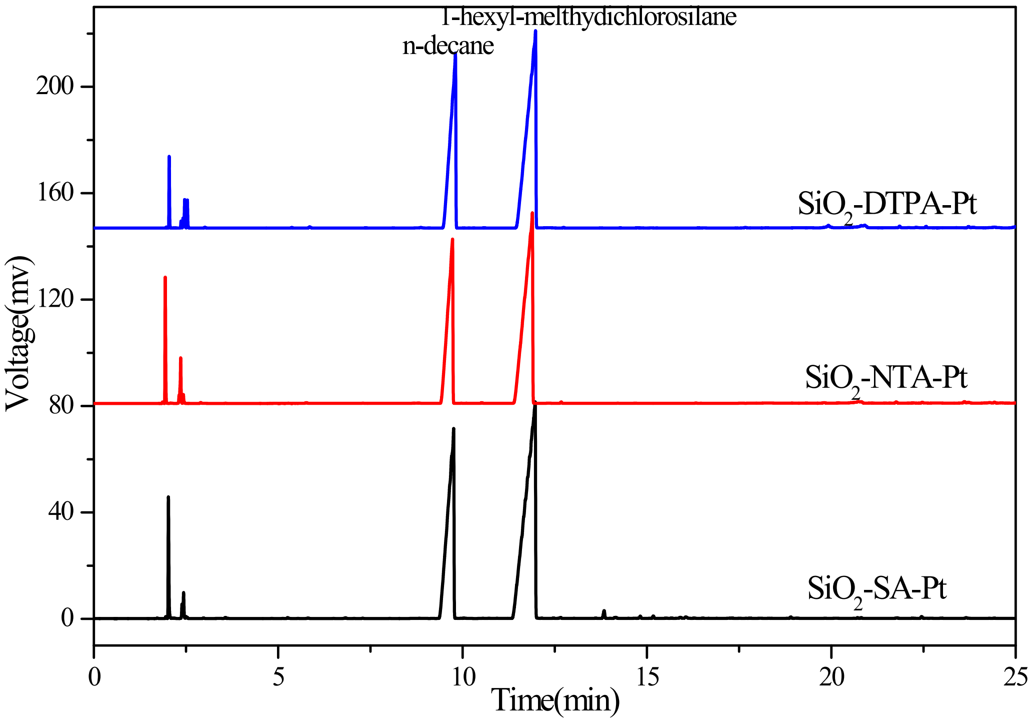


Fig. S4. UV absorption curves of the chloroplatinic acid solution for SiO_2-DTPA-Pt at different solvents.



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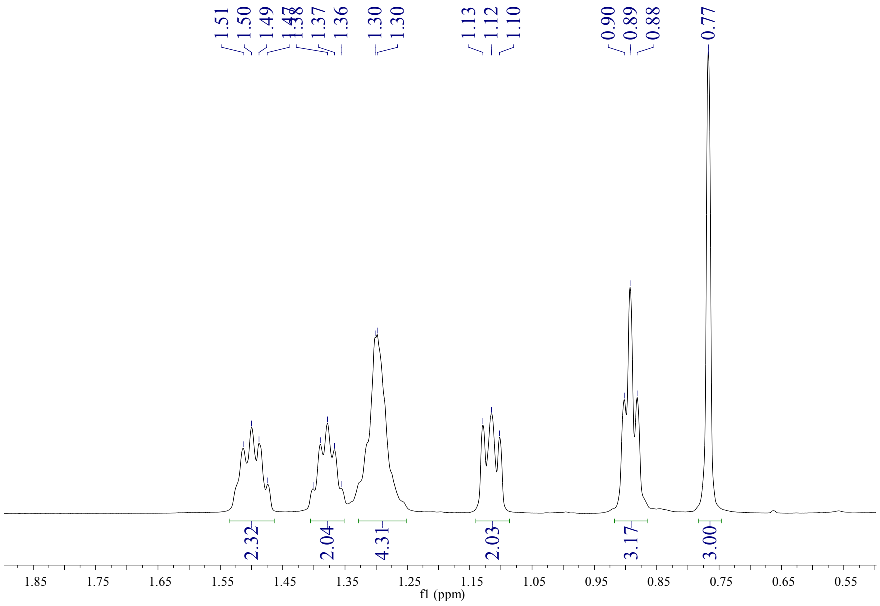
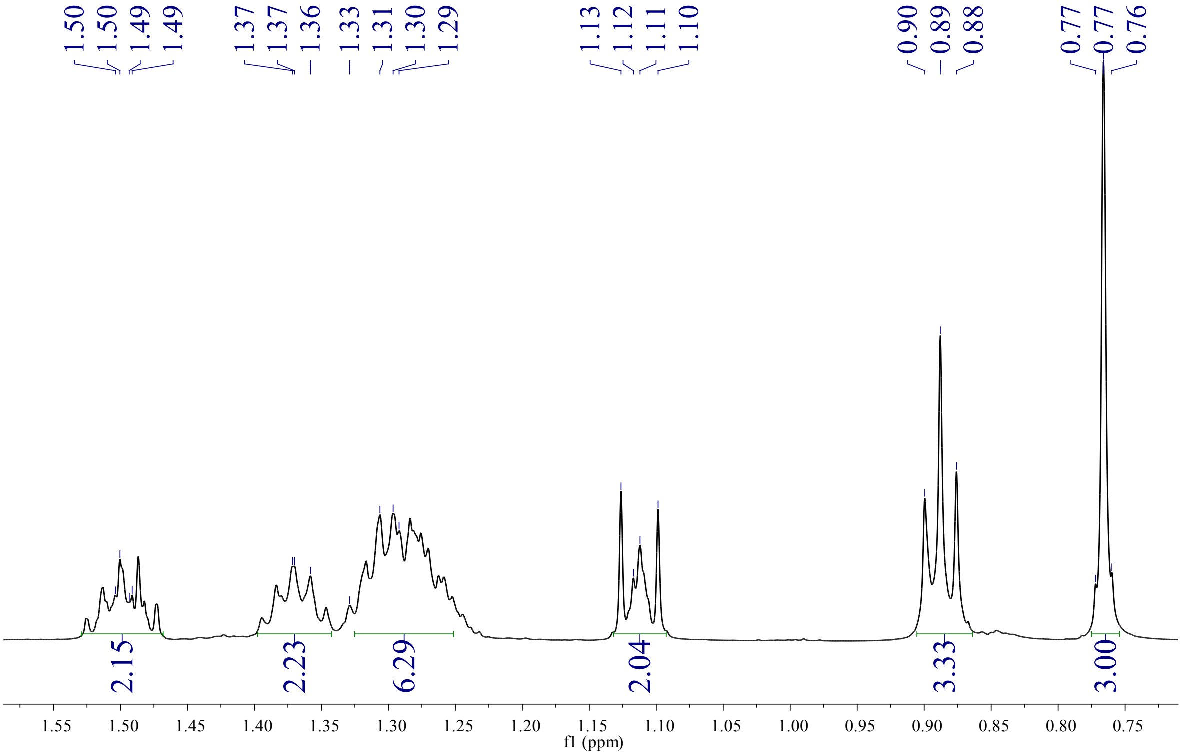


(B)

Fig. S5 (A) The GC spectra of 1-hexane hydrosilylation with methyldichlorosilane catalyzed by SiO_2-APCAs-Pt, (B) The ^1H NMR spectra of dichloromethylhexylsilane,



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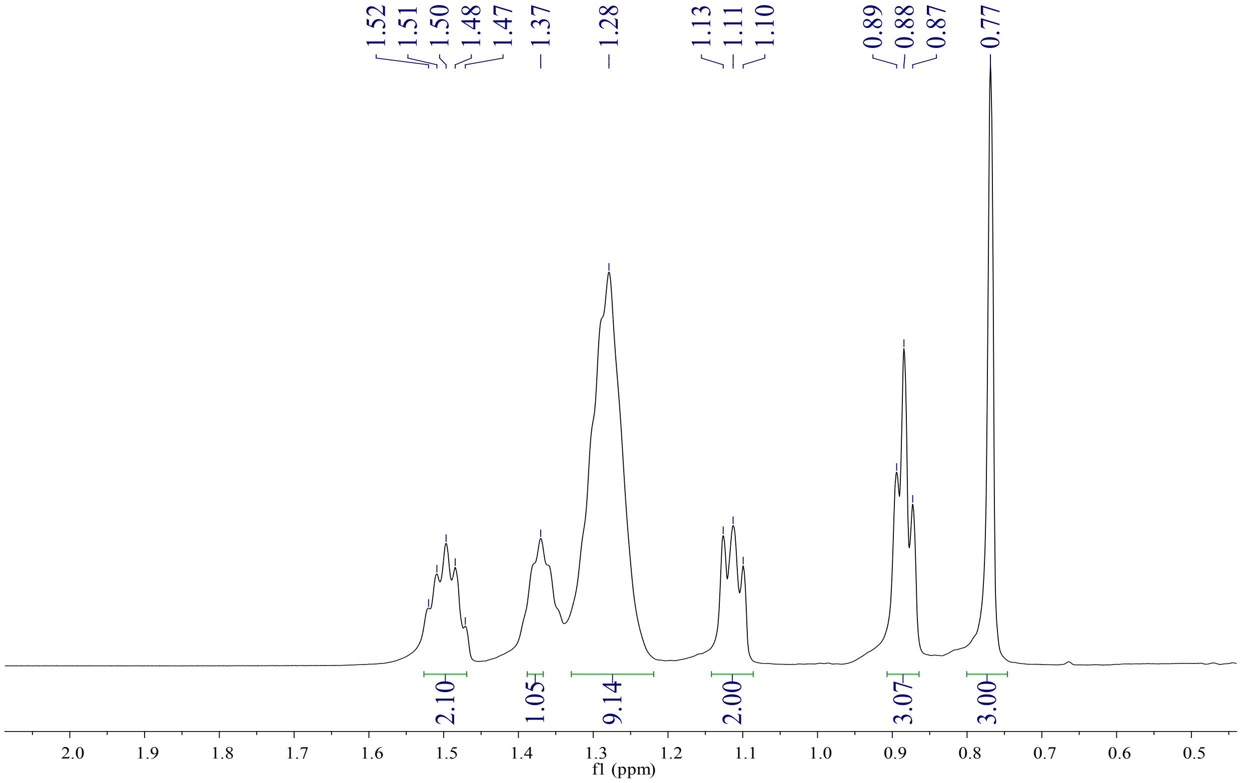
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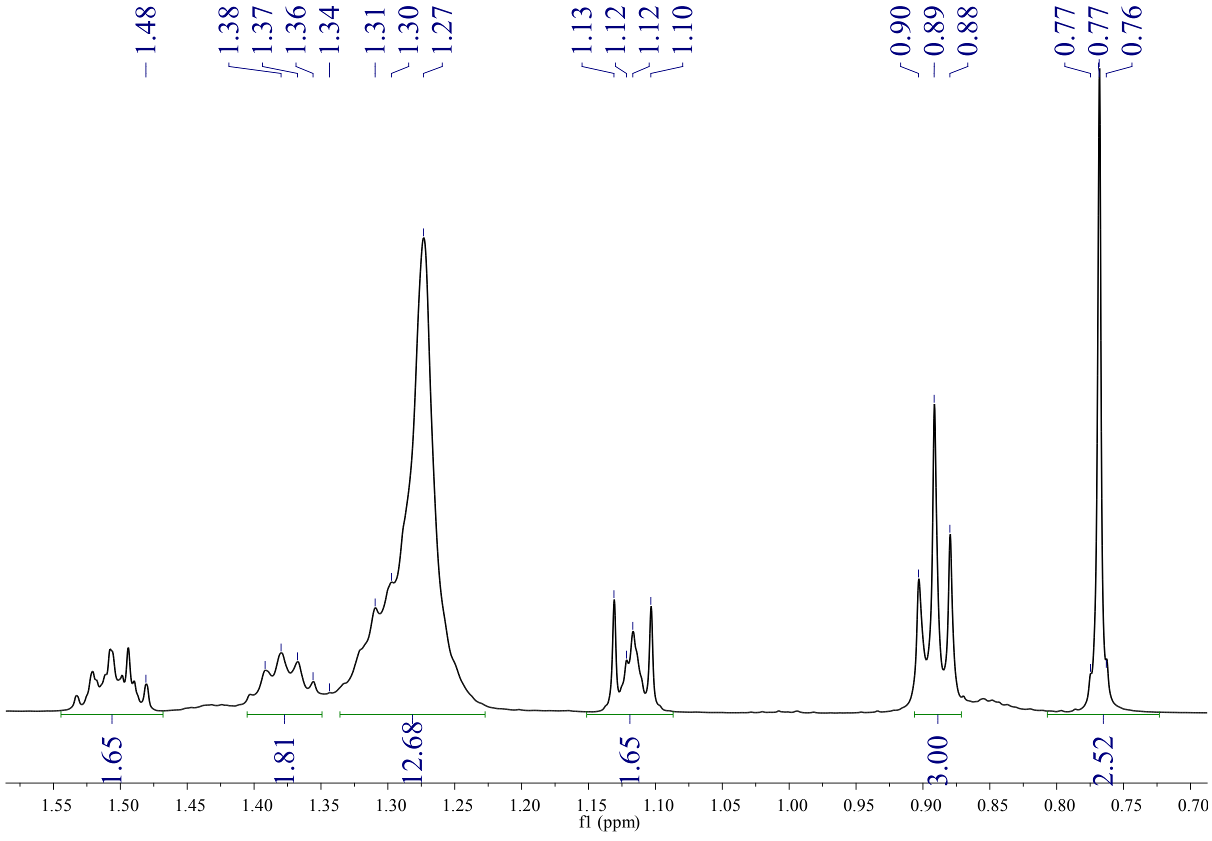
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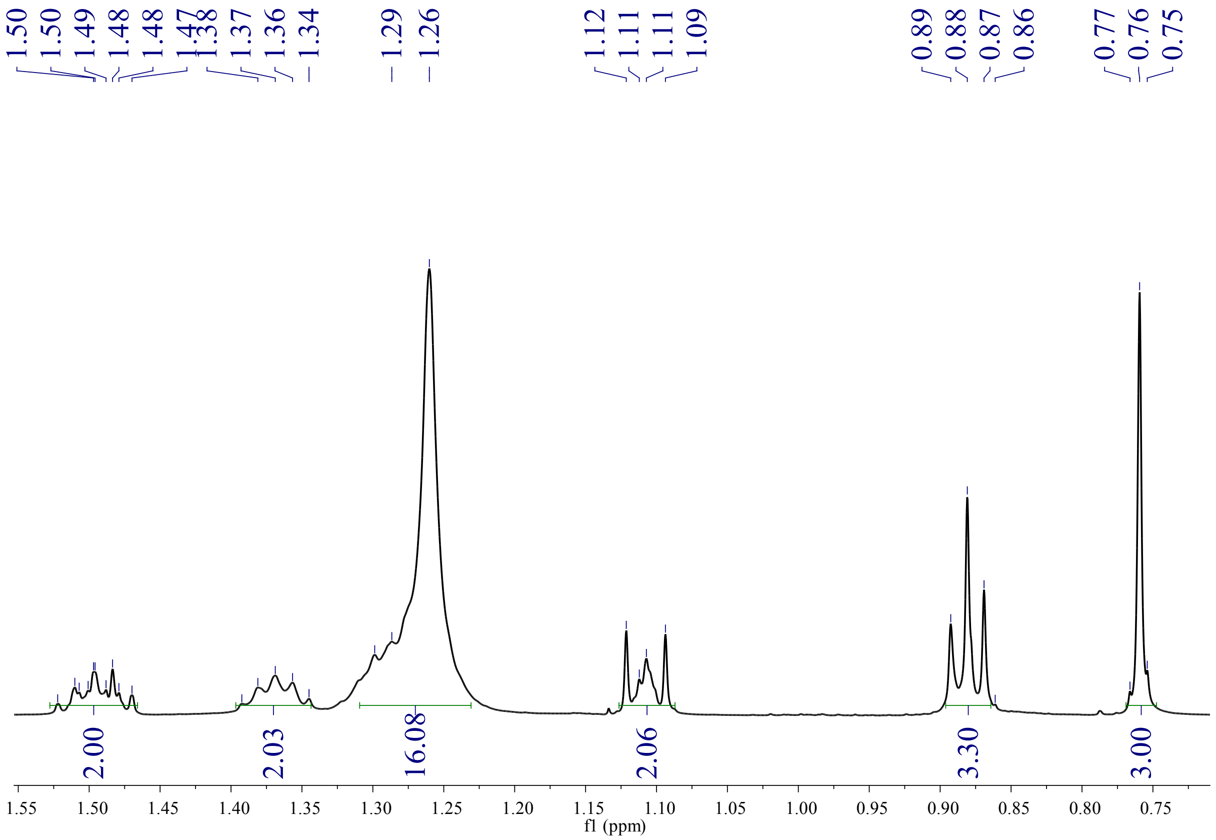
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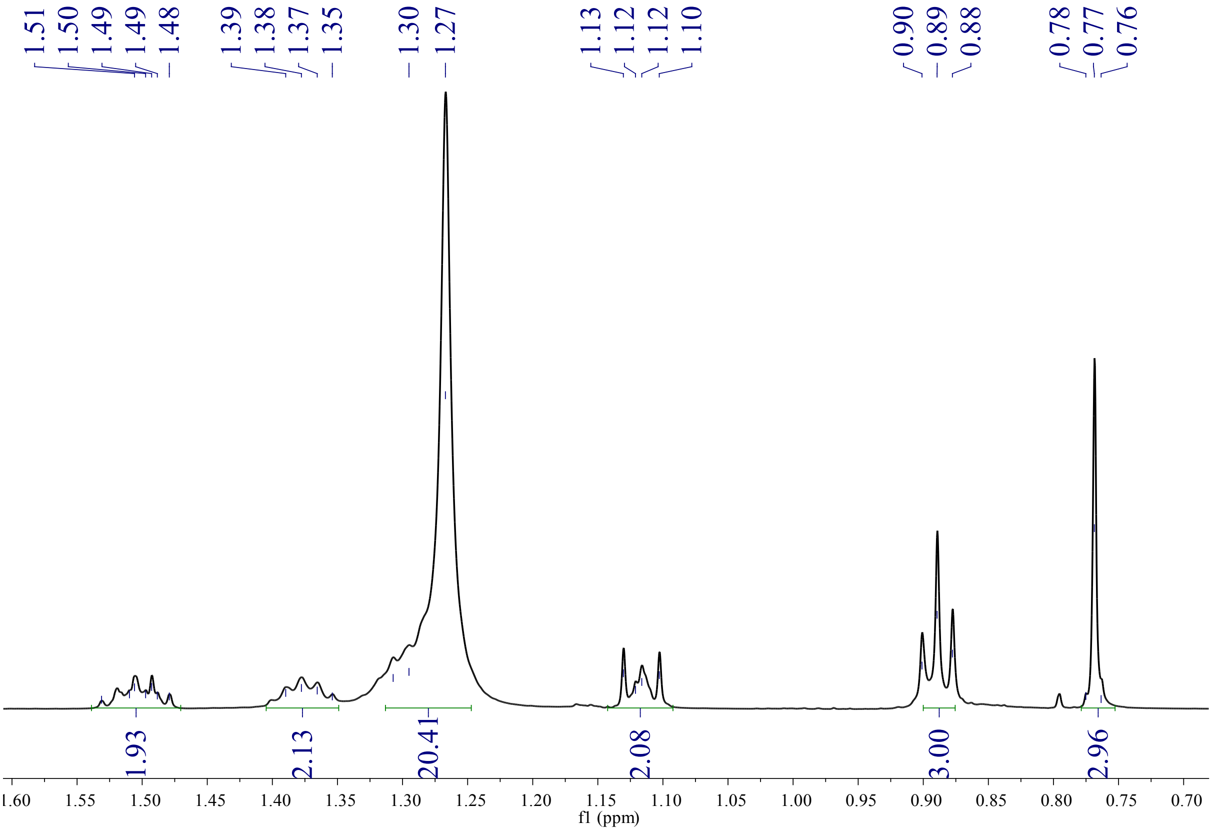
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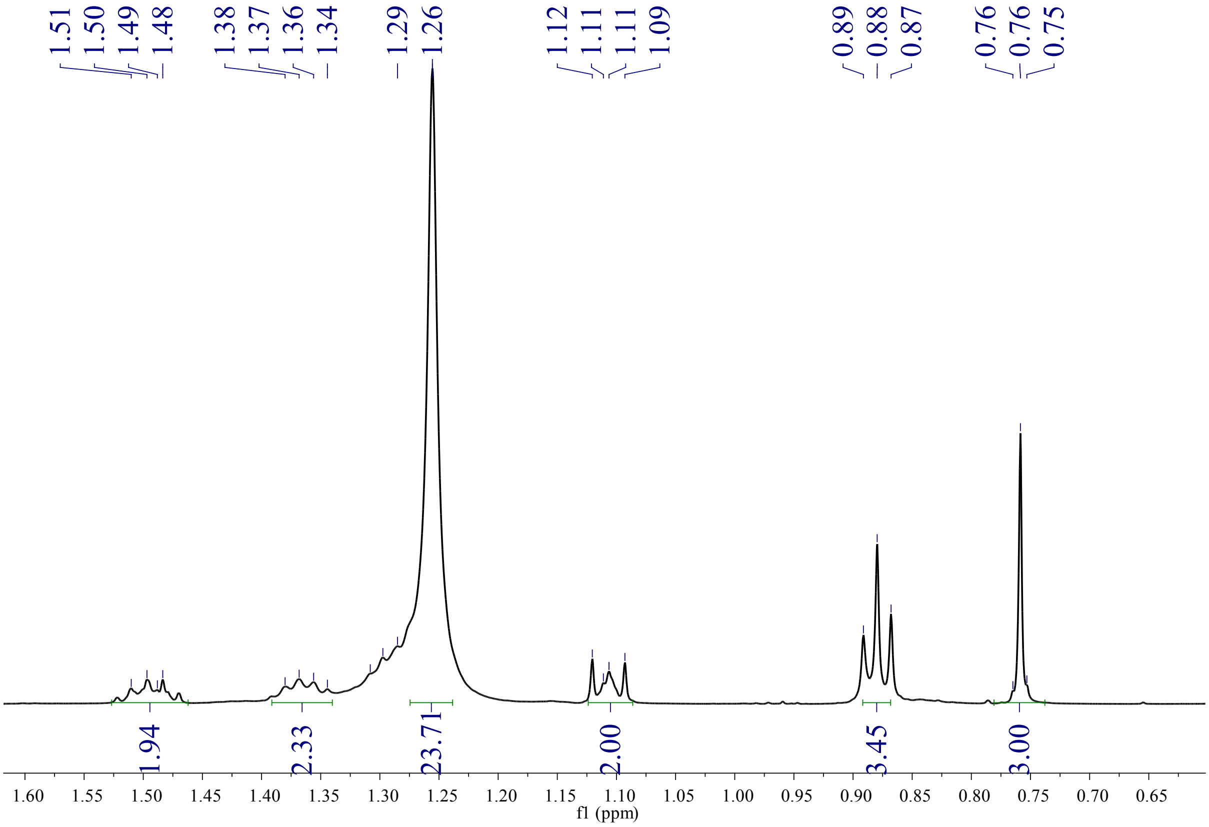
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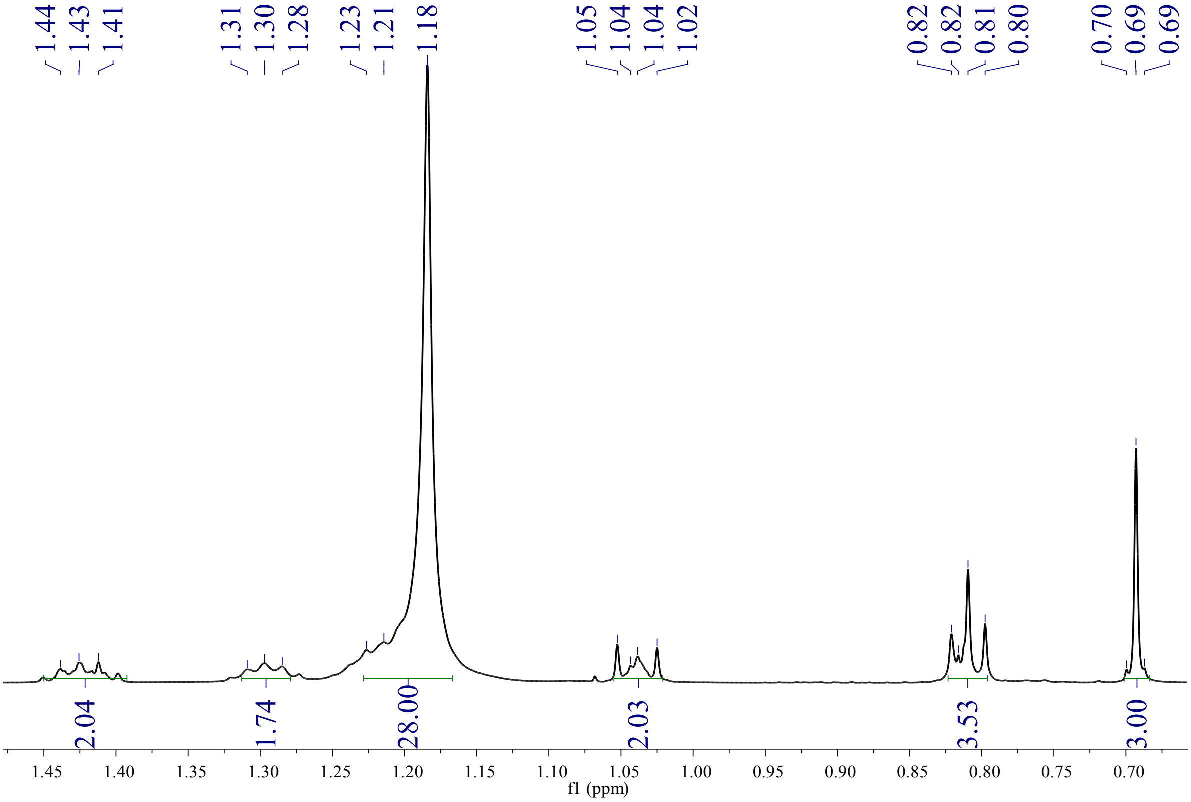
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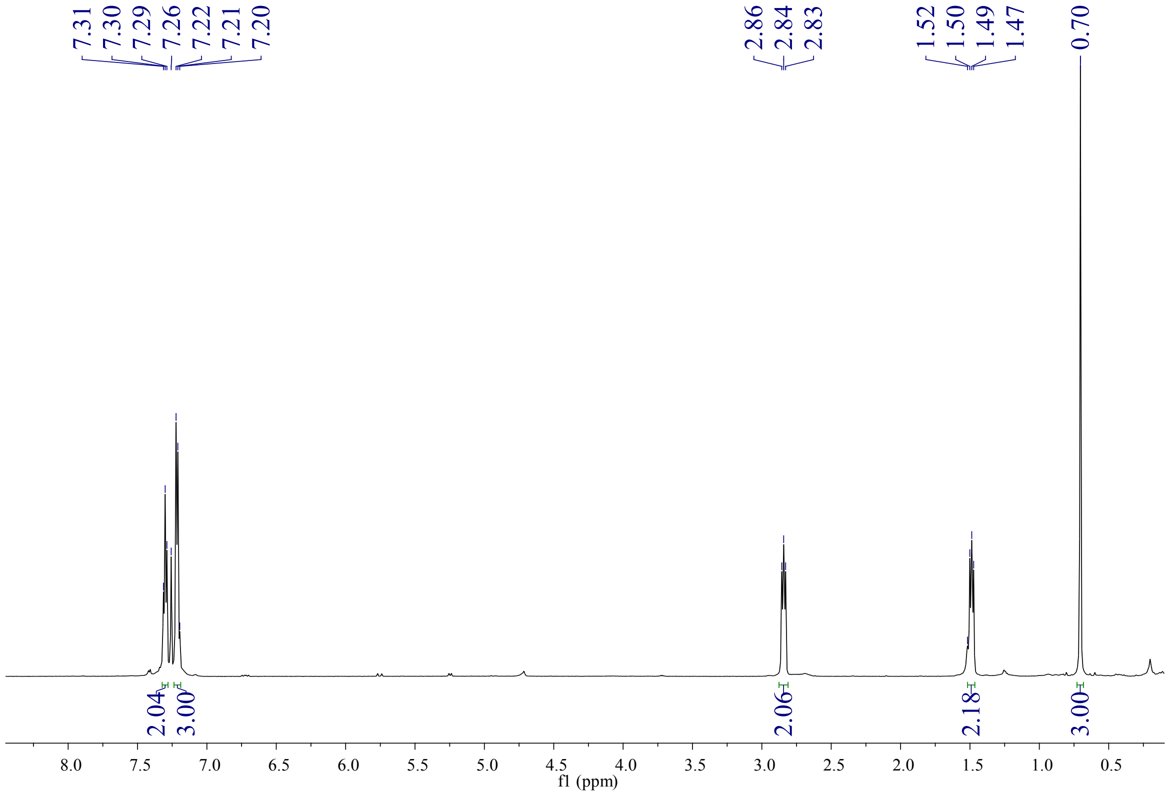
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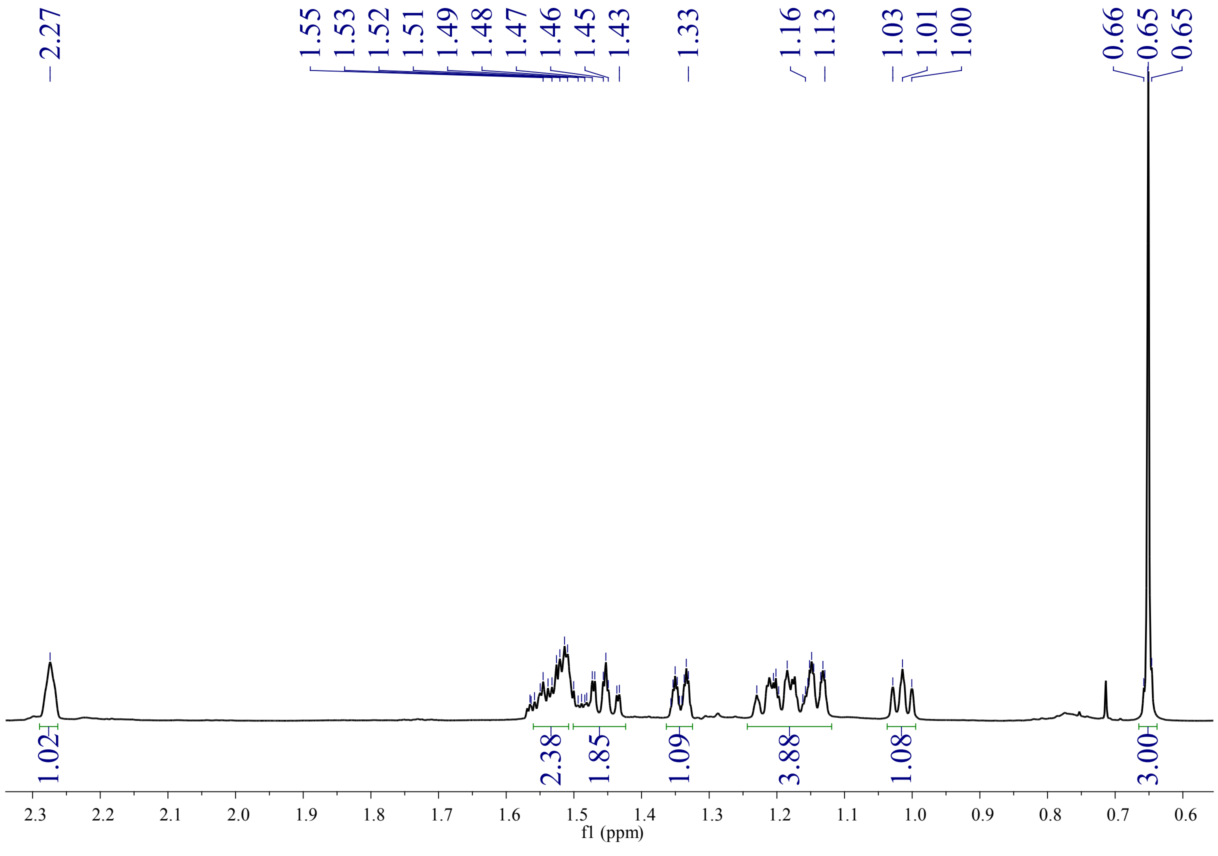
(H)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0.8
0.7
0.6
f1 (ppm)

(I)

Fig. S6 The ^{1}H NMR spectra of the products: (A) dichloromethylheptylsilane; (B) 1-octyl-methylsilane; (C) dichloromethyldecylsilane; (D) dichloromethyldodecylsilane; (E) dichloromethyltetradecylsilane; (F) dichloromethylhexadecylsilane; (G) dichloromethyloctadecylsilane; (H) dichloromethylphenethylsilane; and (I) dichloromethylnorbornylsilane