

Electronic supplementary material

Bis(amido) Rare-earth Complexes Coordinated by Tridentate Amidinate Ligand: Synthesis, Structure and Catalytic Activity in Polymerization of Isoprene and *rac*-Lactide

Aleksei O. Tolpygin, Olesya A. Linnikova, Tatyana A. Glukhova, Anton V. Cherkasov, Georgy K.

Fukin, Alexander A. Trifonov*

Institute of Organometallic Chemistry of Russian Academy of Sciences, Tropinina 49, GSP-445, 630950, Nizhny Novgorod (Russia) Fax: 007831 4627497; Tel: 007 831 4623532; E-mail: trif@iomc.ras.ru

Contents:

Table 1S. Crystallographic data and structure refinement details for **2–4**.

Figure 1S. ^1H NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{Y}(\text{N}(\text{SiMe}_3)_2)_2$ (**2**).

Figure 2S. ^{13}C NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{Y}(\text{N}(\text{SiMe}_3)_2)_2$ (**2**).

Figure 3S. ^{31}P NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{Y}(\text{N}(\text{SiMe}_3)_2)_2$ (**2**).

Figure 4S. IR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{Y}(\text{N}(\text{SiMe}_3)_2)_2$ (**2**).

Figure 5S. IR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{Nd}(\text{N}(\text{SiMe}_3)_2)_2$ (**3**).

Figure 6S. ^1H NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{La}(\text{N}(\text{SiMe}_3)_2)_2$ (**4**).

Figure 7S. ^{13}C NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{La}(\text{N}(\text{SiMe}_3)_2)_2$ (**4**).

Figure 8S. ^{31}P NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{La}(\text{N}(\text{SiMe}_3)_2)_2$ (**4**).

Figure 9S. IR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{La}(\text{N}(\text{SiMe}_3)_2)_2$ (**4**).

Table 1S. Crystallographic data and structure refinement details for **2–4**.

Compound	2	3	4
Empirical formula	C ₄₃ H ₆₈ N ₄ OPSi ₄ Y	C ₄₃ H ₆₈ N ₄ OPSi ₄ Nd	C ₄₃ H ₆₈ N ₄ OPSi ₄ La
Formula weight	889.25	944.58	939.25
T [K]	100(2)		
Wavelength [Å]	0.71073		
Crystal system	Monoclinic		
Space group	C2/c		
a [Å]	21.2784(9)	21.4494(2)	21.5190(6)
b [Å]	12.6709(5)	12.75910(10)	12.7854(3)
c [Å]	36.8622(15)	37.4670(4)	36.8722(10)
α [°]	90	90	90
β [°]	105.1430(10)	108.1100(10)	105.513(3)
γ [°]	90	90	90
Volume [Å ³]	9593.6(7)	9745.82(17)	9775.1(5)
Z	8	8	8
ρ _{calcd.} [g cm ⁻³]	1.231	1.288	1.276
Absorption coefficient [mm ⁻¹]	1.384	1.231	1.039
F(000)	3776	3944	3920
Crystal size [mm]	0.42×0.25×0.18	0.45×0.30×0.15	0.42×0.25×0.18
θ range for data collection [°]	1.90 to 29.00	3.16 to 29.00	3.16 to 29.00
Index ranges	-28≤h≤28, -17≤k≤16, -49≤l≤49	-29≤h≤29, -17≤k≤17, -51≤l≤51	-29≤h≤28, -17≤k≤17, -50≤l≤46
Reflections collected	50161	93016	28859
Independent reflections	12692	12919	12946
R _{int}	0.0415	0.0420	0.0577
Completeness to θ [%]	99.8	99.8	99.7
Data/restraints/parameters	12692 / 0 / 504	12919 / 0 / 504	12946 / 0 / 504
Goodness-of-fit on F ²	1.043	1.123	1.024
Final R indices [I>2σ(I)]	R ₁ = 0.0394, wR ₂ = 0.0857	R ₁ = 0.0287, wR ₂ = 0.0592	R ₁ = 0.0531, wR ₂ = 0.0746
R indices (all data)	R ₁ = 0.0604, wR ₂ = 0.0911	R ₁ = 0.0335, wR ₂ = 0.0606	R ₁ = 0.0849, wR ₂ = 0.0811
Largest diff. peak and hole [eÅ ⁻³]	0.555 / -0.393	0.686 / -1.111	0.780 / -1.127

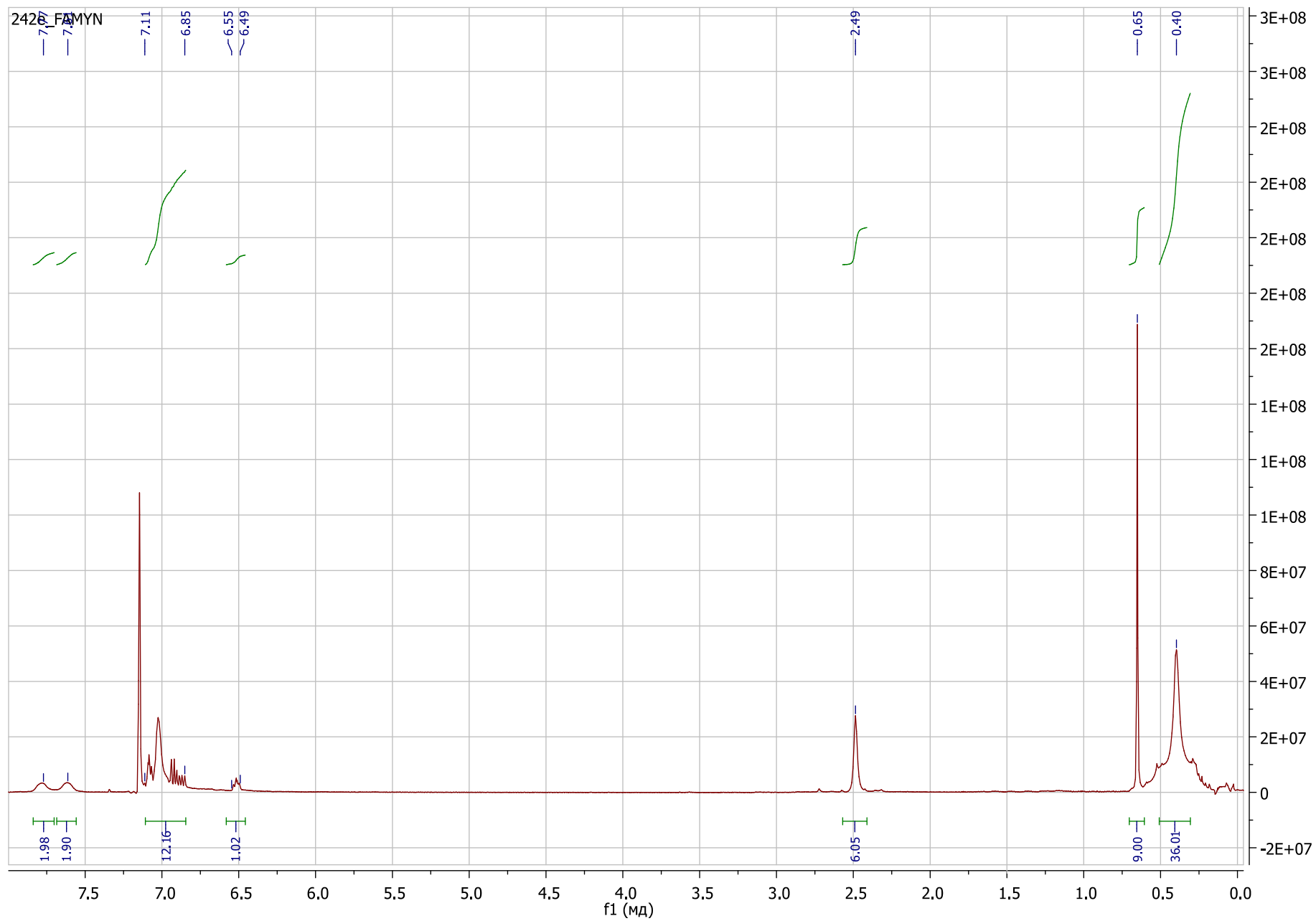


Figure 1S. ^1H NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)]\text{Y}(\text{N}(\text{SiMe}_3)_2)_2$ (**2**).

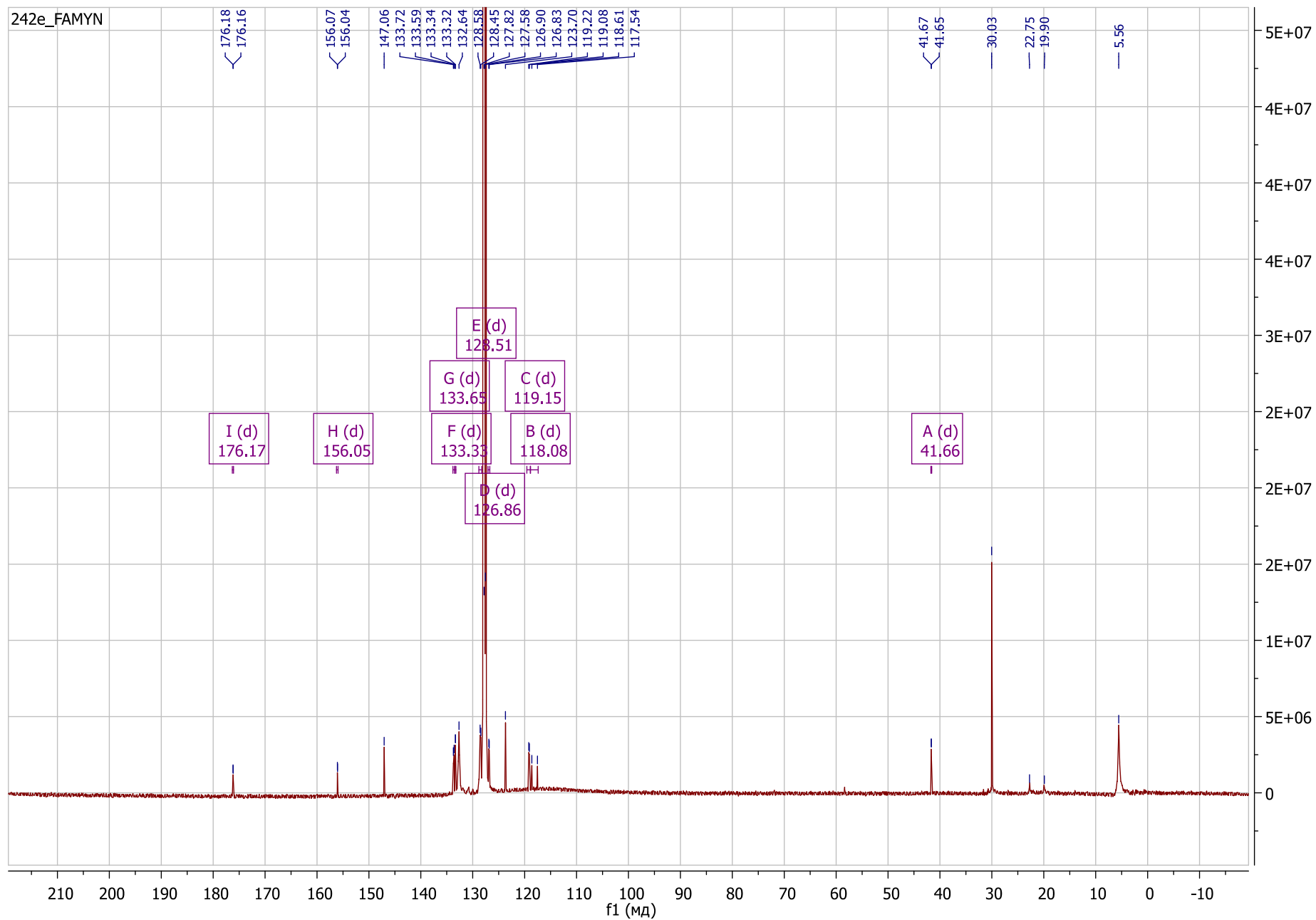


Figure 2S. ^{13}C NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(\text{tBu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{Y}(\text{N}(\text{SiMe}_3)_2)_2$ (**2**).

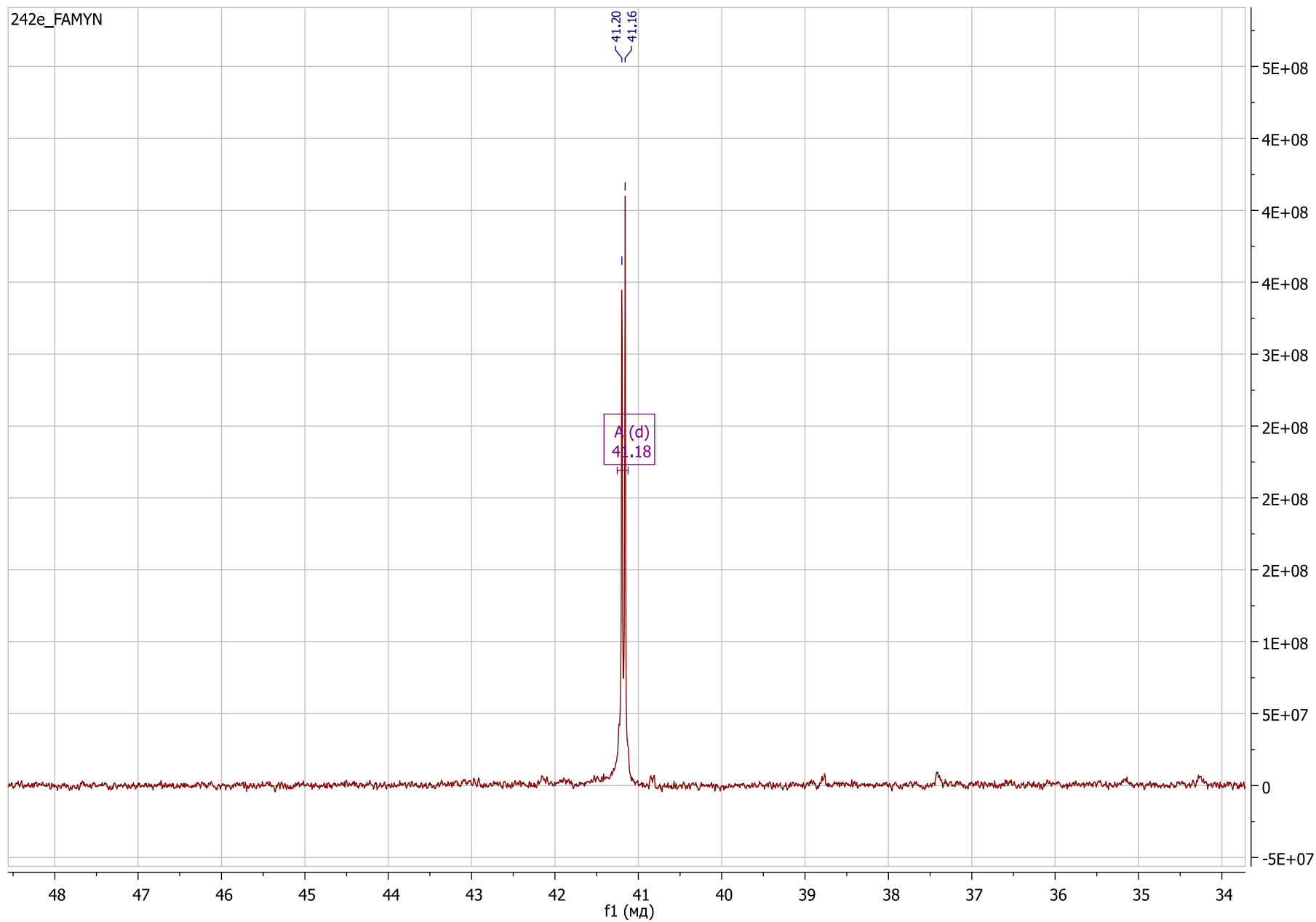


Figure 3S. ^{31}P NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)]\text{Y}(\text{N}(\text{SiMe}_3)_2)_2$ (**2**).

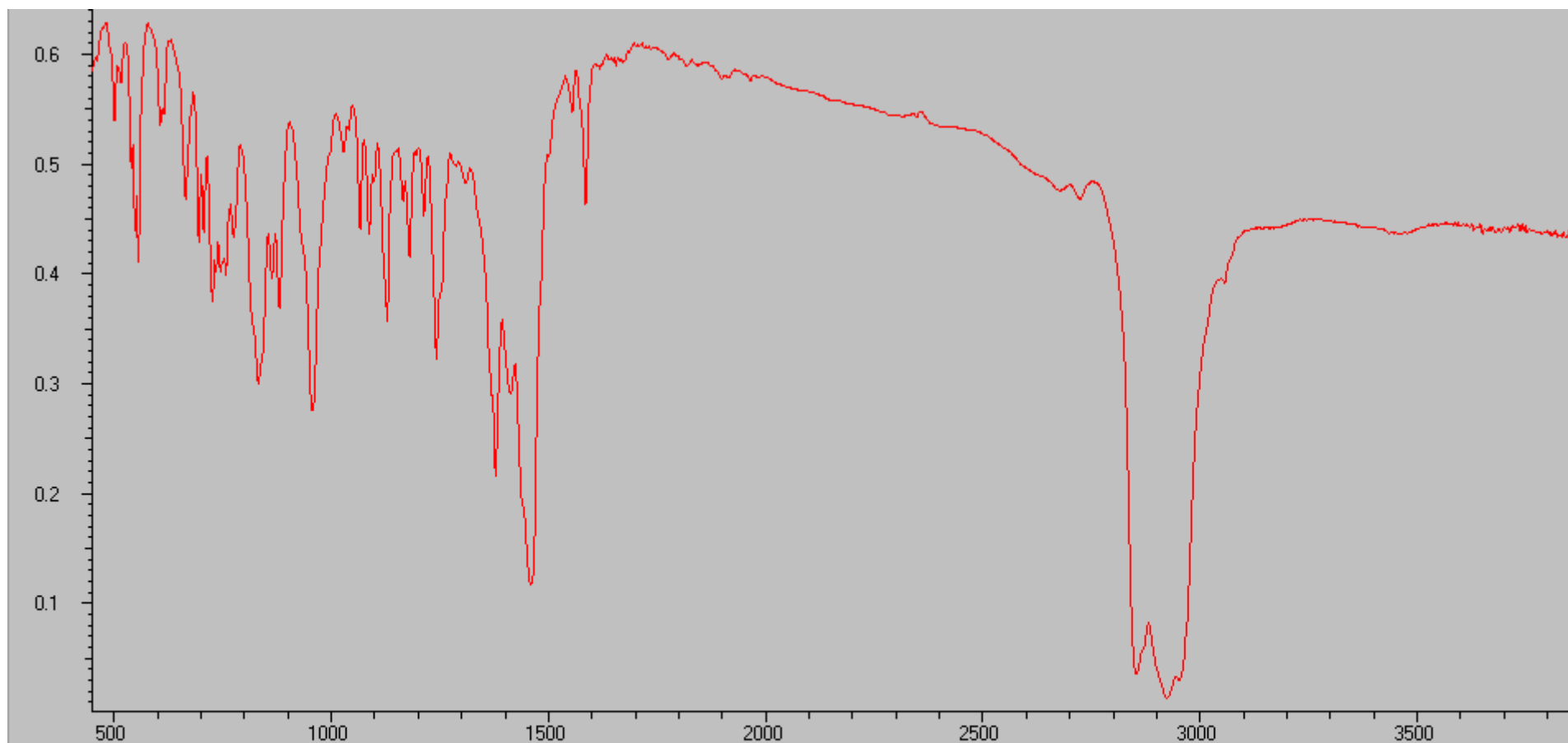


Figure 4S. IR spectrum of {2-[Ph₂P(O)]C₆H₄NC(*t*Bu)N(2,6-Me₂C₆H₃)}Y(N(SiMe₃)₂)₂ (**2**).

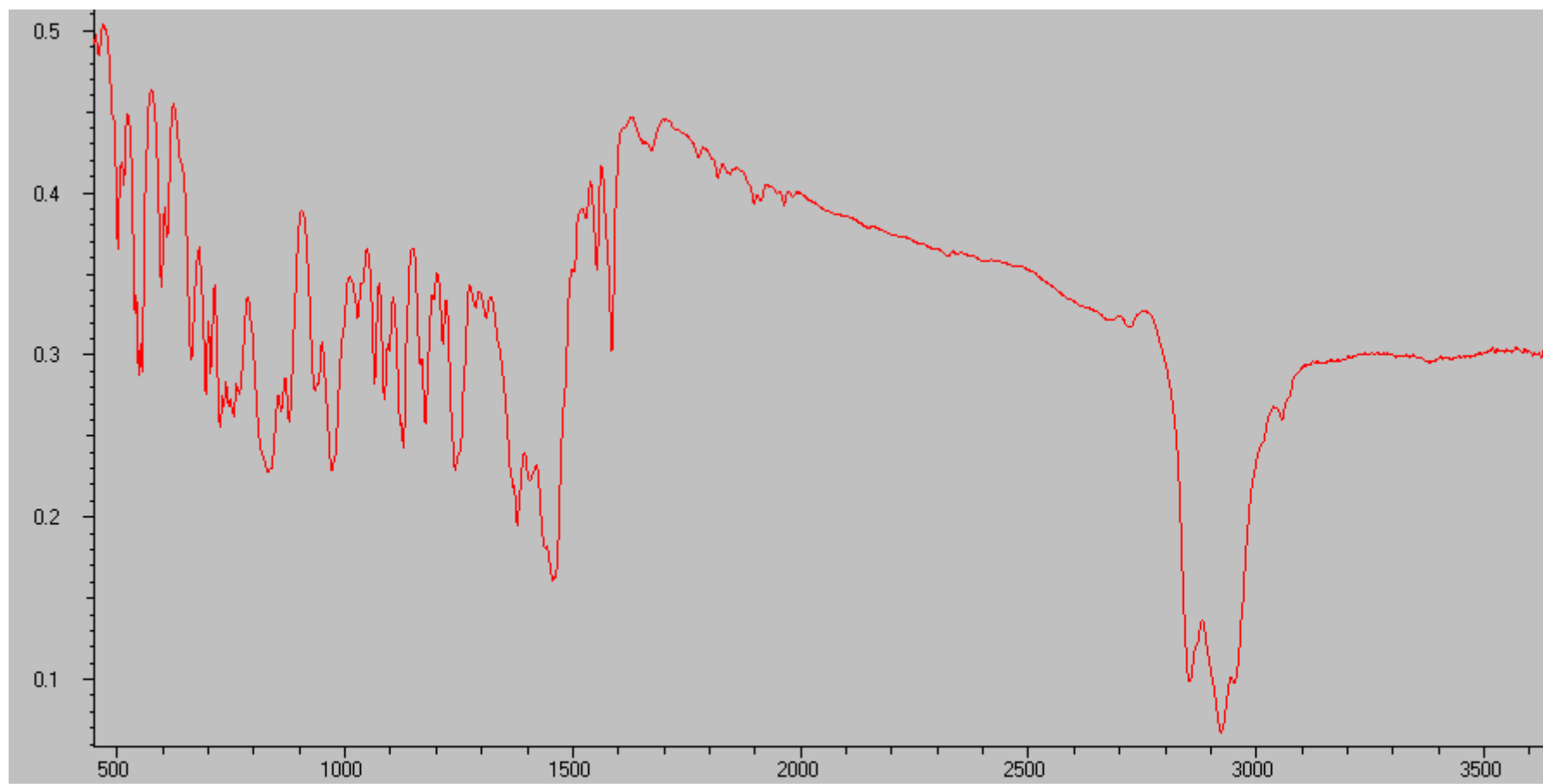


Figure 5S. IR spectrum of $\{2\text{-[Ph}_2\text{P(O)]C}_6\text{H}_4\text{NC}(t\text{Bu)N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{Nd}(\text{N}(\text{SiMe}_3)_2)_2$ (**3**).

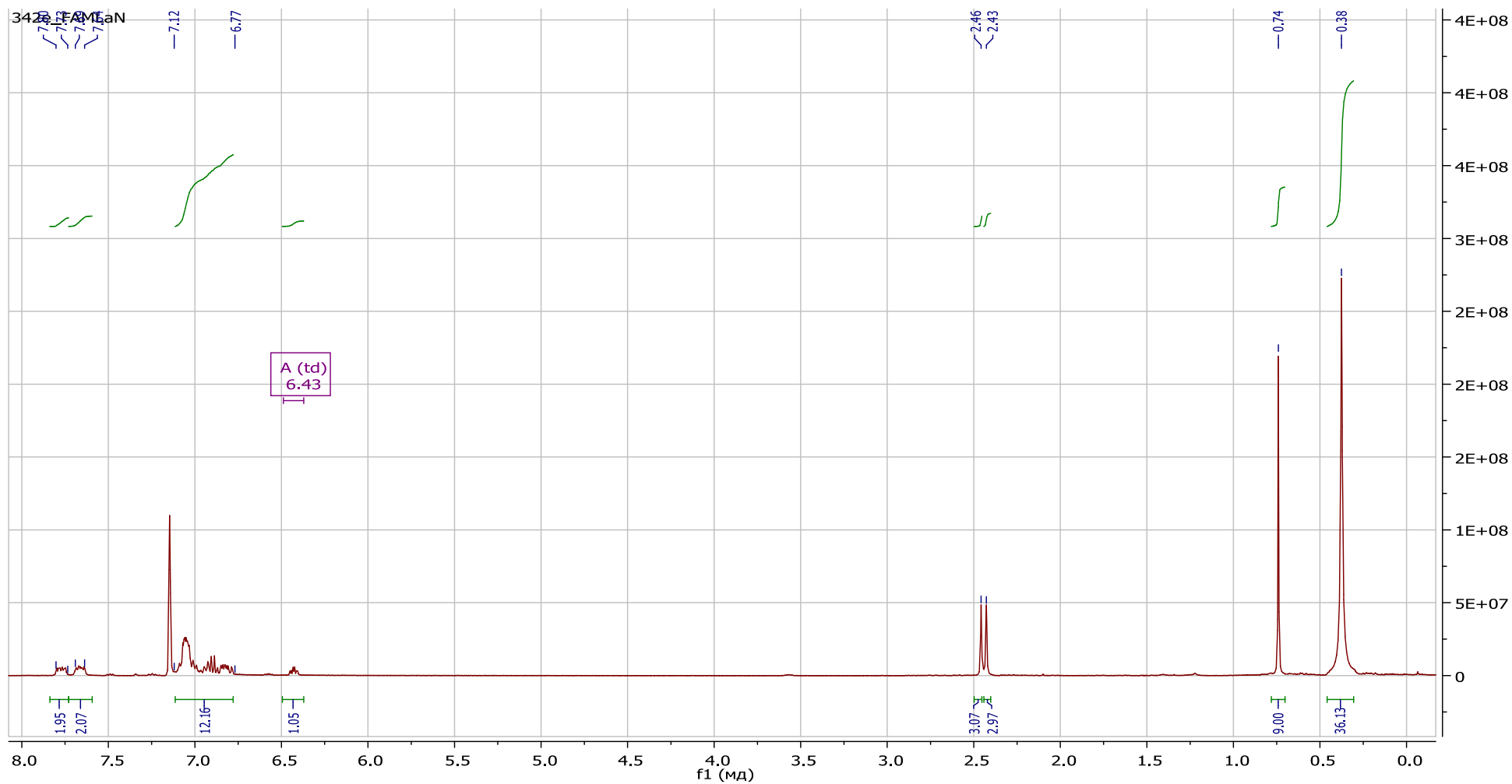


Figure 6S. ^1H NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)]\text{La}(\text{N}(\text{SiMe}_3)_2)_2$ (**4**).

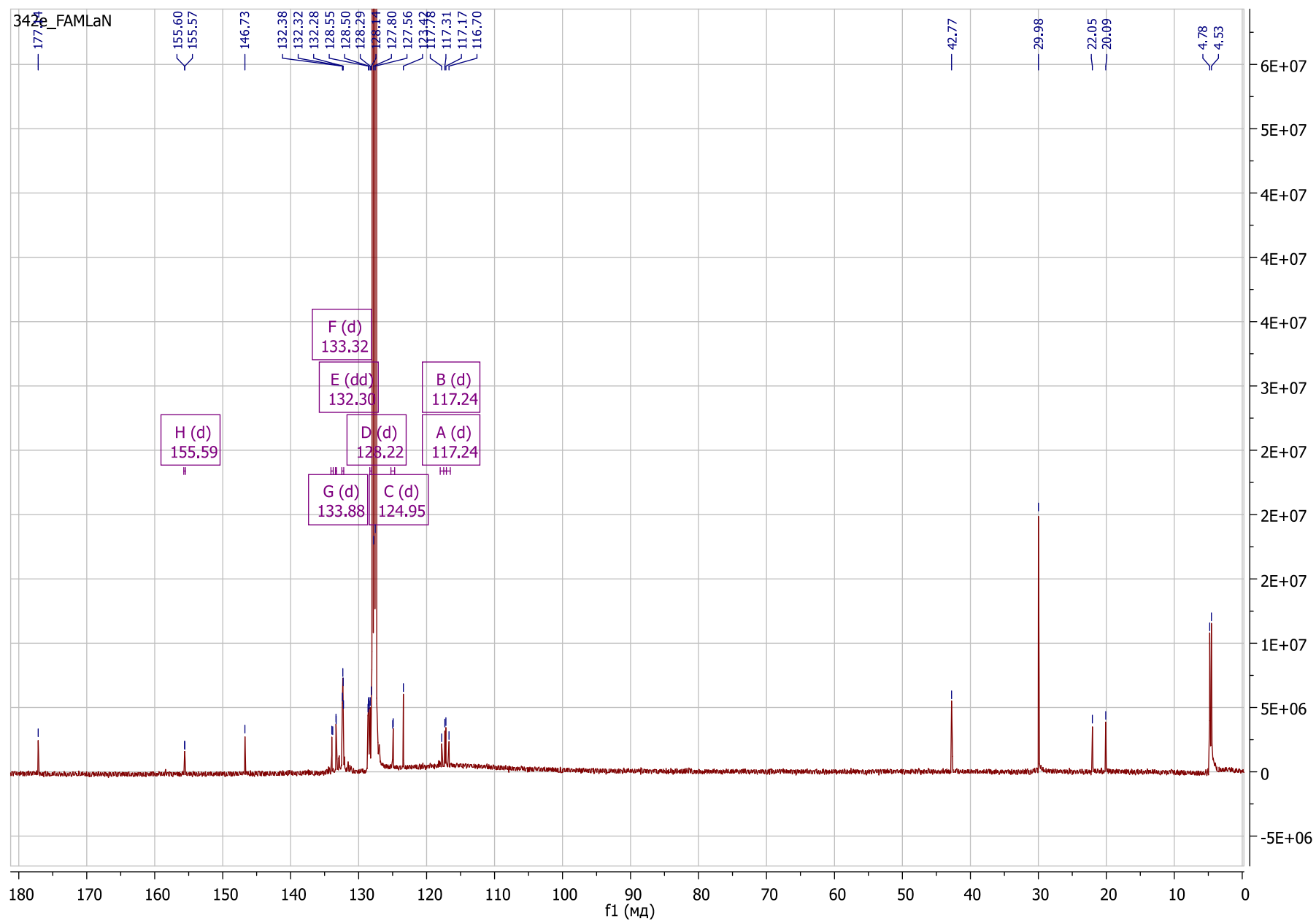


Figure 7S. ^{13}C NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)]\text{La}(\text{N}(\text{SiMe}_3)_2)_2$ (**4**).

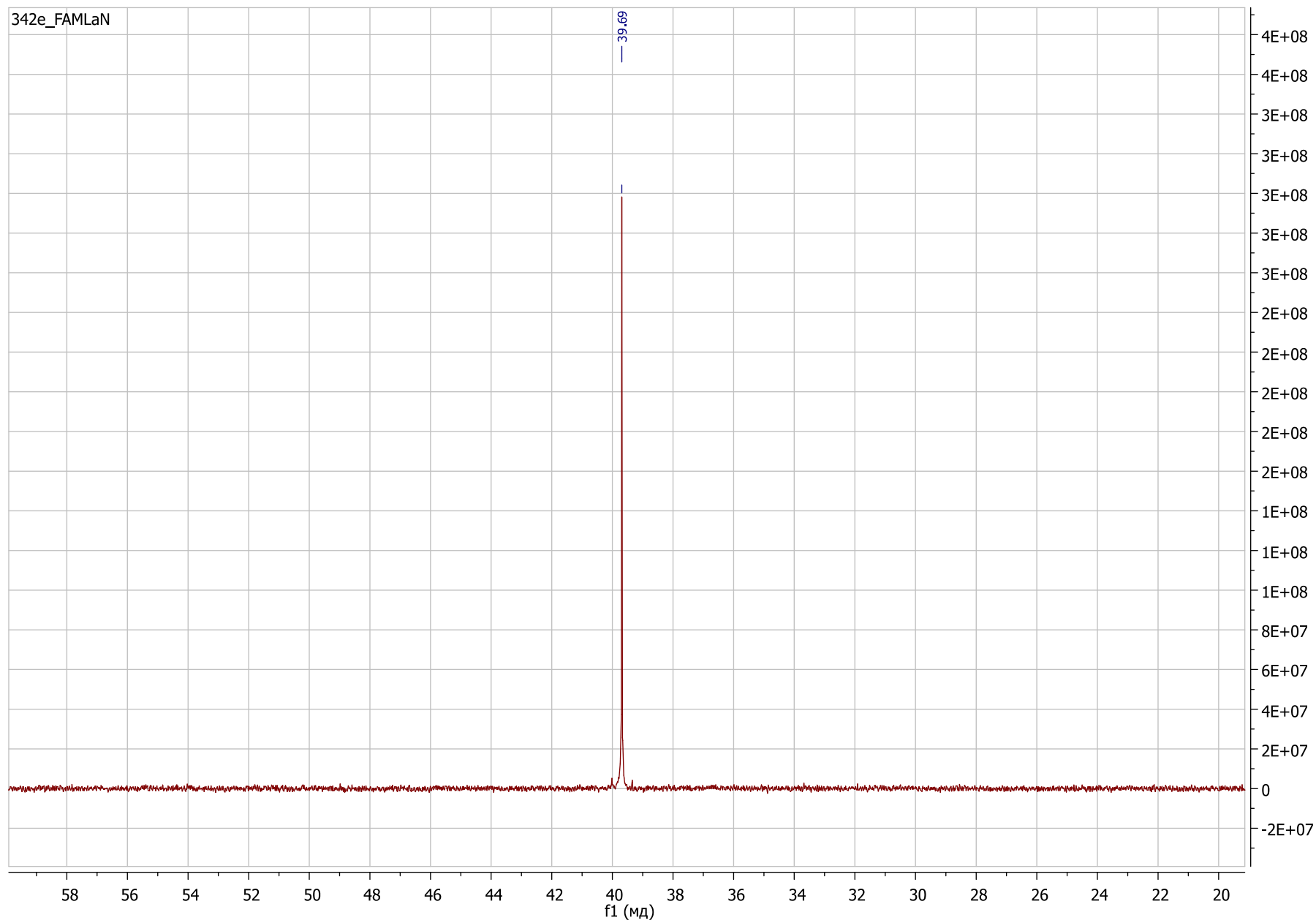


Figure 8S. ^{31}P NMR spectrum of $\{2\text{-}[\text{Ph}_2\text{P}(\text{O})]\text{C}_6\text{H}_4\text{NC}(t\text{Bu})\text{N}(2,6\text{-Me}_2\text{C}_6\text{H}_3)\}\text{La}(\text{N}(\text{SiMe}_3)_2)_2$ (**4**).

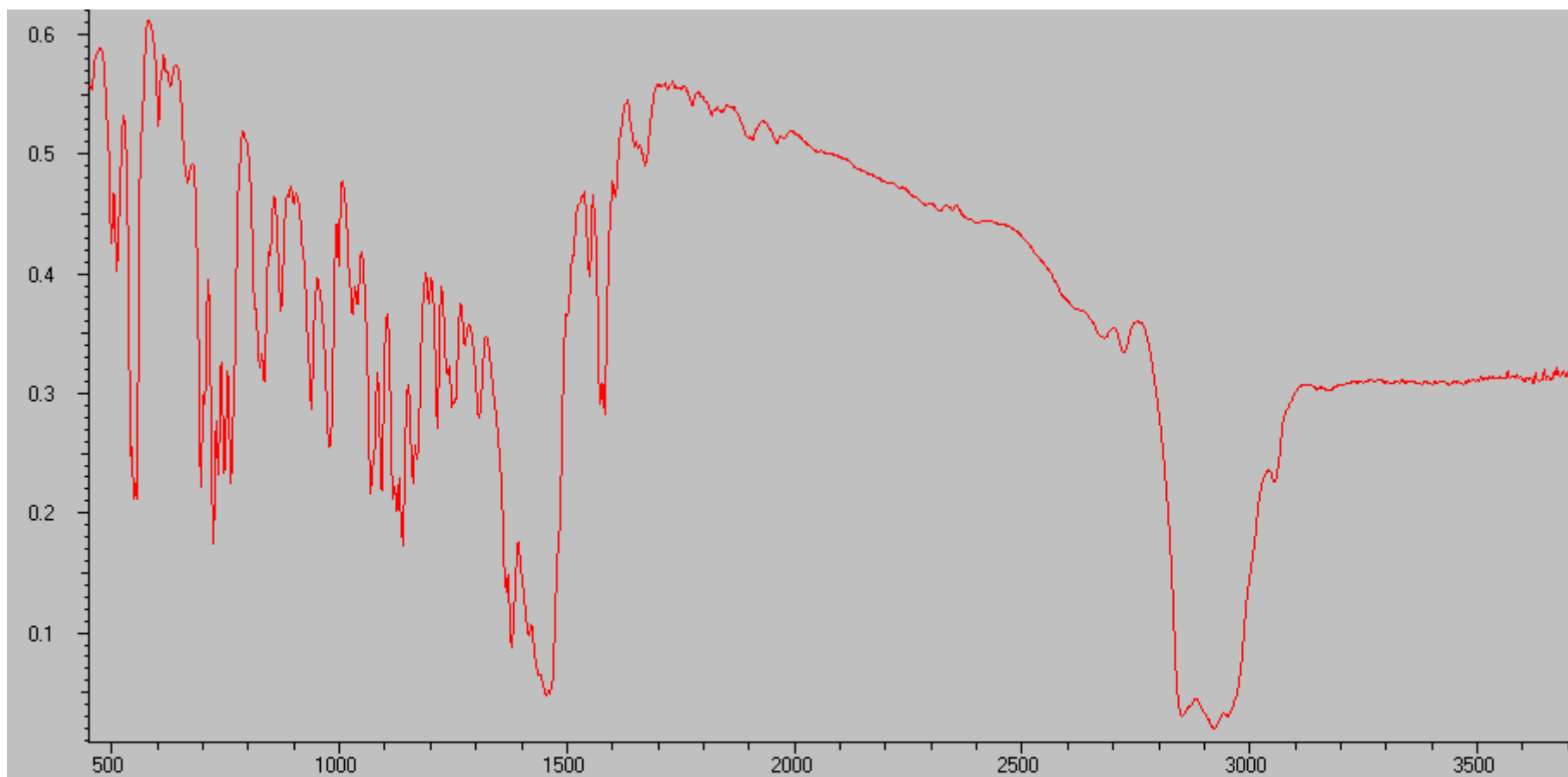


Figure 9S. IR spectrum of {2-[Ph₂P(O)]C₆H₄NC(*t*Bu)N(2,6-Me₂C₆H₃)}La(N(SiMe₃)₂)₂ (**4**).