Electron supporting information.

Rare-earth dichloro and bis(alkyl) complexes supported by bulky amido-imino ligand. Synthesis, structure, reactivity and catalytic activity in isoprene polymerization.

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Fig. 1. ¹H NMR of **2Y**.

- **Fig. 2.** ¹H NMR of **2Y** (next day).
- **Fig. 3.** $^{13}C{^{1}H}$ NMR of **2Y** (next day).
- Fig. 4. Molecular structure of 2Lu.
- **Fig. 5.** ¹2Lu.
- **Fig. 6.** ${}^{13}C{}^{1}H$ NMR of **2Lu** (next day).
- **Fig. 7.** ¹H NMR of **3**.
- **Fig. 8.** ${}^{13}C{}^{1}H$ NMR of **3**.
- **Fig. 9.** ¹H NMR of **4Y**.**Fig. 10.** ¹³C{¹H} NMR of **4Y**.**Fig. 11.** ¹H NMR of **4Lu**.**Fig. 12.** ¹³C{¹H}
- NMR of **4Lu**.
- **Fig. 13.** ¹H NMR of **5**.
- **Fig. 14.** ${}^{13}C{}^{1}H$ NMR of **5**.
- Fig. 15. EPR spectrum of 6.
- Fig. 16. EPR spectrum of 8.
- Fig. 17. EPR spectrum of 10.



Fig. 1. ¹H NMR spectrum of 2Y.



Fig. 2. ¹H NMR spectrum of 2Y (next day). # – signals attributed to [(2,6- $iPr_2C_6H_3$)NC(=CH₂)C(=CH₂)N(C₆H₃-2,6- iPr_2)]YCl(THF)_n; * – signals attributed to [(2,6- $iPr_2C_6H_3$)N=C(Me)C(Me)=N(C₆H₃-2,6- iPr_2)].



Fig. 3. ¹³C{¹H} NMR spectrum of 2Y (next day). # – signals attributed to [(2,6- $iPr_2C_6H_3$)NC(=CH₂)C(=CH₂)N(C₆H₃-2,6- iPr_2)]YCl(THF)_n; * – signals attributed to [(2,6- $iPr_2C_6H_3$)N=C(Me)C(Me)=N(C₆H₃-2,6- iPr_2)].



Fig. 4. Molecular structure of complex $[(2,6-iPr_2C_6H_3)N=C(Me)C(=CH_2)N(C_6H_3-2,6-iPr_2)]LuCl_2(THF)_2$ (2Lu). Thermal ellipsoids are drawn at the 30% probability level. Hydrogen atoms of 2,6-diisopropylphenyl substitutes and THF molecules are omitted for clarity. Selected distances [Å] and angles [°]: Lu(1)-N(1) 2.3353(16), Lu(1)-N(2) 2.3048(17), Lu(1)-Cl(1) 2.5383(5), Lu(1)-Cl(2) 2.5316(6), Lu(1)-O(1) 2.3312(13), Lu(1)-O(2) 2.3280(14), N(1)-C(1) 1.327(3), N(2)-C(2) 1.342(3), C(1)-C(3) 1.438(3), C(1)-C(2) 1.485(3), C(2)-C(4) 1.417(3); N(2)-Lu(1)-N(1) 70.62(6), Cl(1)-Lu(1)-Cl(2) 162.306(17), O(1)-Lu(1)-O(2) 100.09(5), N(1)-C(1)-C(3) 124.46(19), N(1)-C(1)-C(2) 116.45(17), C(3)-C(1)-C(2) 119.07(19), N(2)-C(2)-C(4) 124.81(18), N(2)-C(2)-C(1) 116.77(18), C(4)-C(2)-C(1) 118.42(18).



Fig. 5. ¹H NMR spectrum of 2Lu.



Fig. 6. ¹³C{¹H} NMR spectrum of **2Lu**. # – signals attributed to [(2,6- $iPr_2C_6H_3$)NC(=CH₂)C(=CH₂)N(C₆H₃-2,6- iPr_2)]LuCl(THF)_n; * – signals attributed to [(2,6- $iPr_2C_6H_3$)N=C(Me)C(Me)=N(C₆H₃-2,6- iPr_2)].



Fig. 7. ¹H NMR spectrum of **3**.



Fig. 8. ${}^{13}C{}^{1}H$ NMR spectrum of **3**.



Fig. 9. ¹H NMR spectrum of **4**Y.



Fig. 10. $^{13}C{^{1}H}$ NMR spectrum of **4Y**.

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Fig. 12. ${}^{13}C{}^{1}H$ NMR spectrum of **4Lu**.







Fig. 14. ${}^{13}C{}^{1}H$ NMR spectrum of **5**.







Fig. 16. EPR spectrum of 8.



Fig. 17. EPR spectrum of 10.