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Figure S-1 - Partial  $^1\text{H}$ - $^1\text{H}$  (400 MHz) NOESY spectrum of  $[\text{Cp}_2\text{ZrMe}][\text{MeB}(\text{C}_6\text{F}_5)_3]$  (0.056 M) and  $\text{MeAl}(\text{BHT})_2$  (0.26 M) in  $\text{C}_6\text{D}_6$  at 22 °C. Mixing time = 1.0 sec. Slices through diagonal and cross-peaks corresponding to spectra depicted in Figure S-2 are indicated with dashed lines.

Figure S-2 - 1D slices through the 2D spectrum depicted in Figure S-1. Peak intensities and S:N ratios along with the regions used to determine noise are indicated. To determine an upper limit for  $k_{\text{ex}}$  between the Zr-Me signal ( $\delta$  0.24) and the Al-Me signal ( $\delta$  -0.35), S:N values of 1830 (based on region 2 and  $I_D/I_X$ ) and 6790, respectively were used to estimate

$$k_{\text{ex}} = \frac{1}{\tau_m} \ln \left( \frac{r+1}{r-1} \right) \text{ where } r = \left( \frac{\Phi_D + \Phi_D''}{8} \right) = \left( \frac{1830 + 6790}{8} \right) = 1078.^1 \text{ This gives an upper estimate for } k_{\text{ex}} = 0.00186 \text{ s}^{-1} \text{ at } 295 \text{ K.}$$

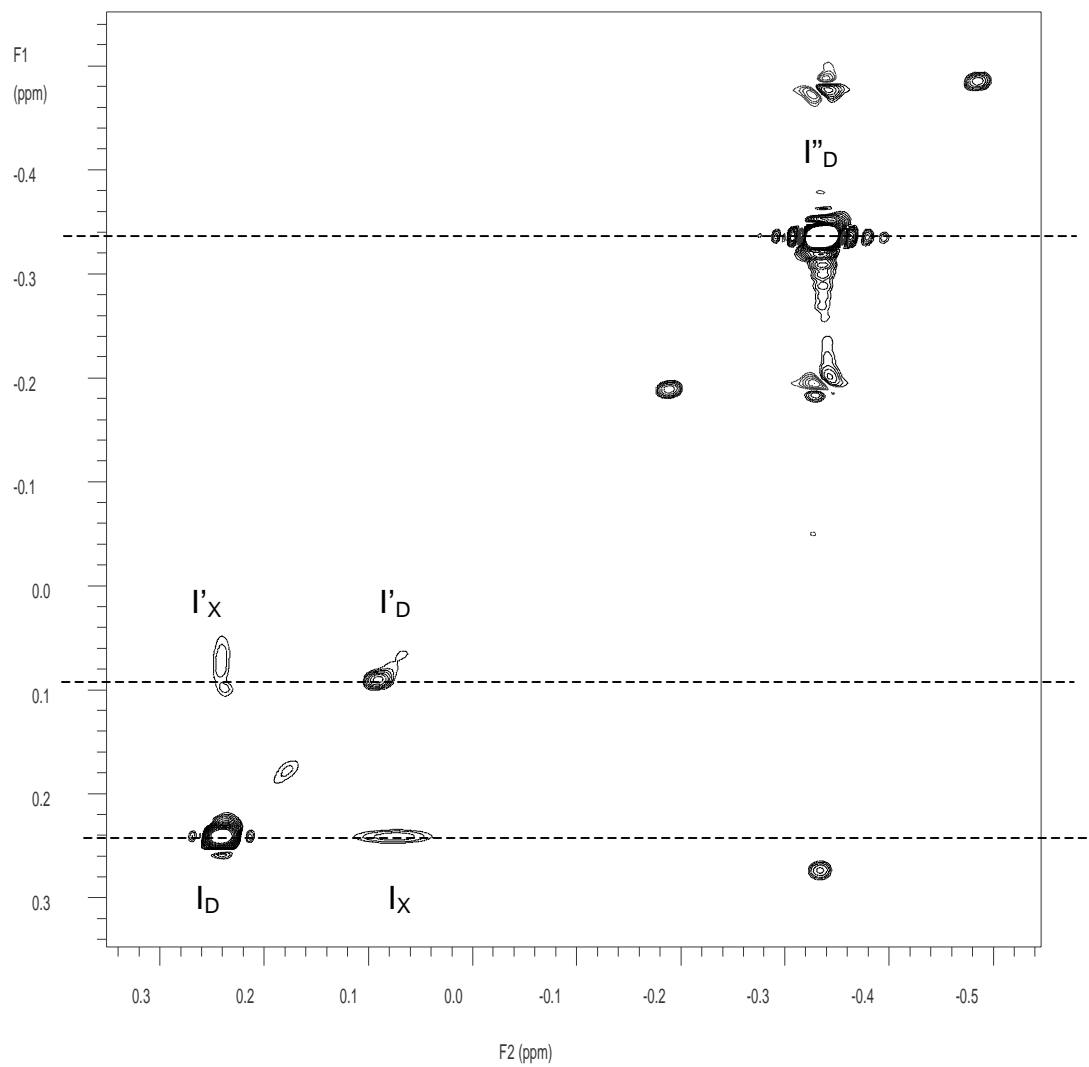
S-3

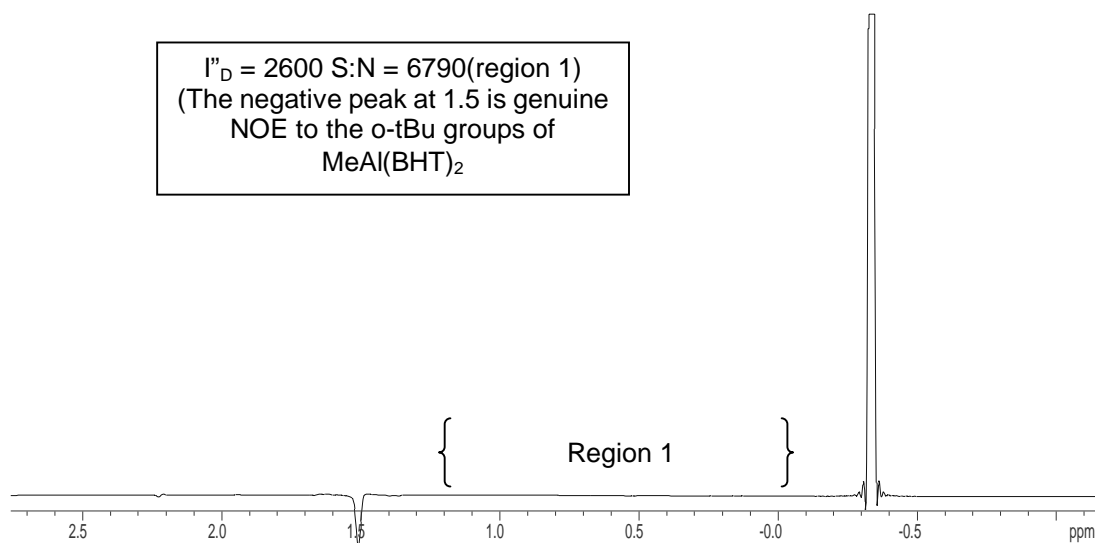
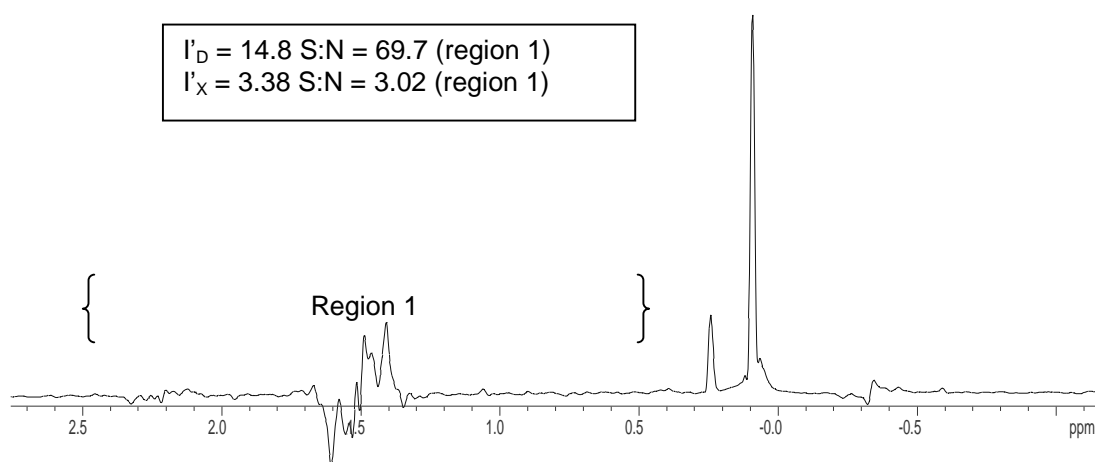
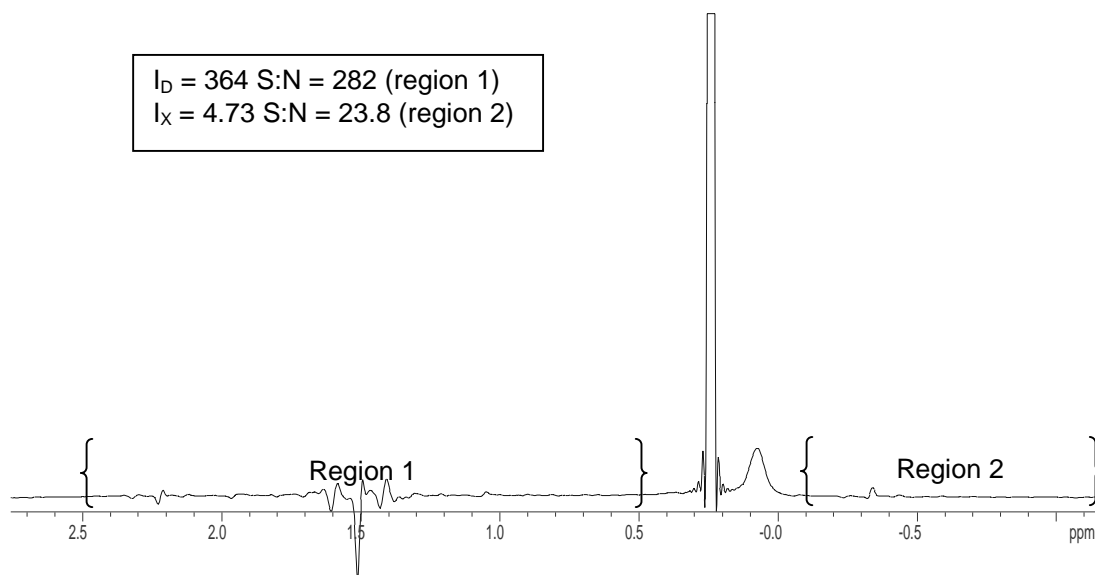
Figure S-3 Selected  $^1\text{H}$  NMR spectra (300 MHz,  $\text{C}_6\text{D}_6$ , 25 °C) of a mixture of  $[\text{BHT-H}]_0 = 0.0091 \text{ M}$  and  $\text{MeAl}(\text{BHT})_2$  before and after the addition of  $\text{Al}_2\text{Me}_6$   $[\text{Me}_2\text{Al}(\text{BHT})]_0 = 0.0080 \text{ M}$ . Inset is second-order kinetics plot for this reaction, monitoring the disappearance of BHT-H and  $\text{Me}_2\text{Al}(\text{BHT})$ .

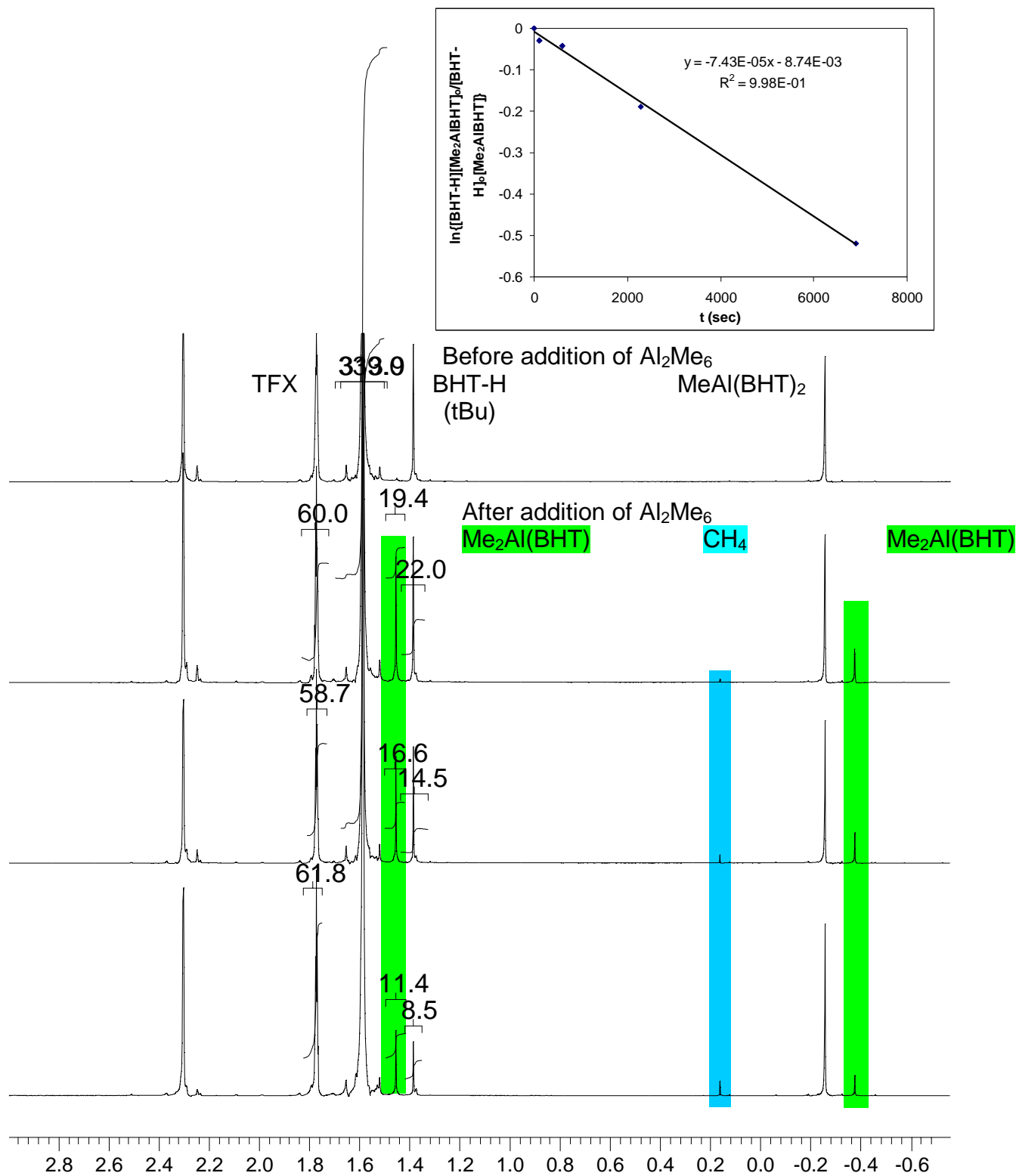
S-4

Figure S-4 -  $^1\text{H}$  NMR Spectra ( $\text{C}_6\text{D}_6$  40 °C) of a mixture of  $[\text{Cp}_2\text{Zr}^{13}\text{Me}][^{13}\text{MeB}(\text{C}_6\text{F}_5)]$  and  $\text{MeAl}(\text{BHT})_2$  as a function of time. Plot of the rate of disappearance of  $\text{Zr-}^{13}\text{CH}_3$  and appearance of  $\text{Al-}^{13}\text{C}$  satellites as a function of time.

S-5







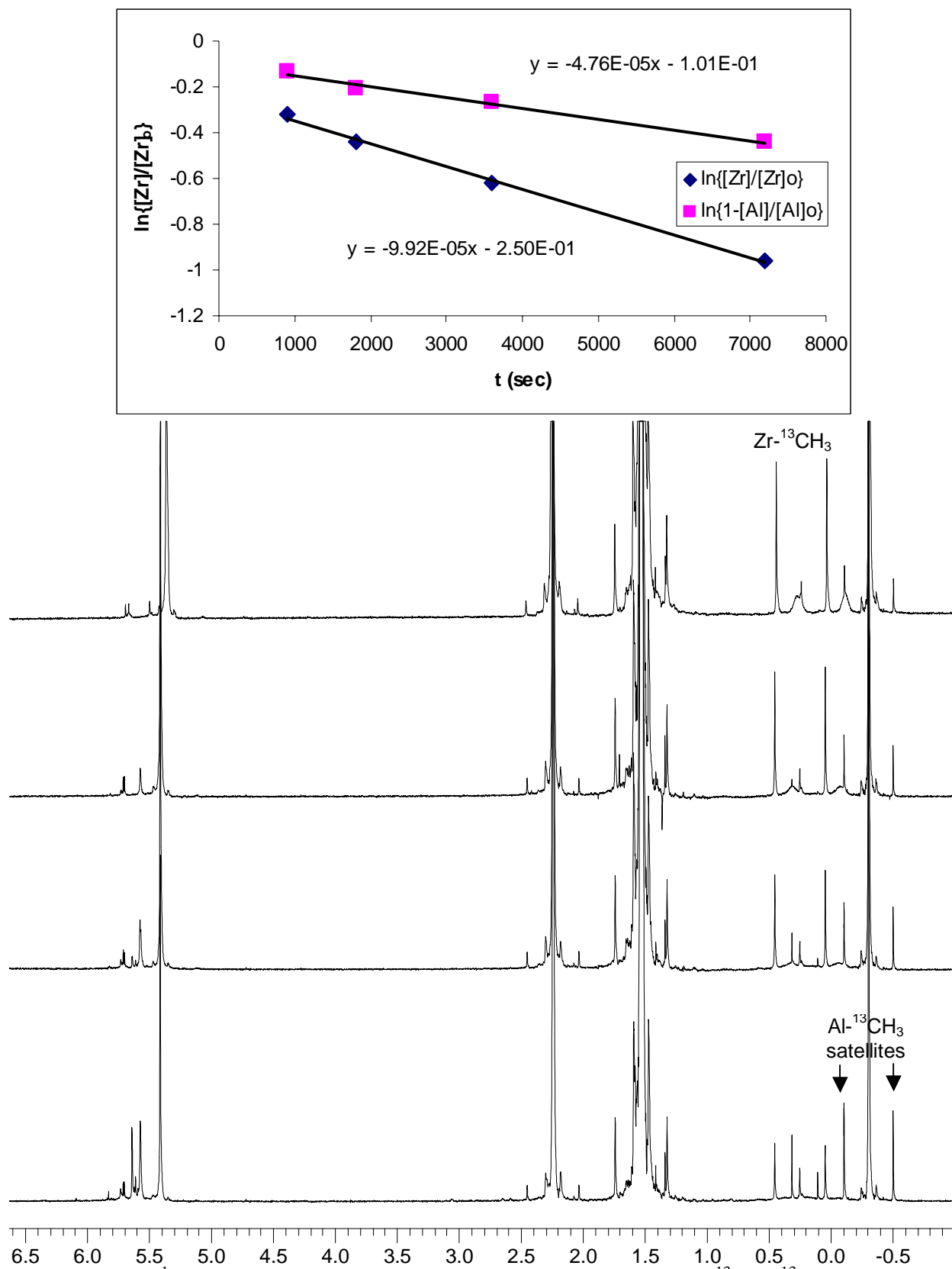


Figure S-4 -  $^1\text{H}$  NMR Spectra ( $\text{C}_6\text{D}_6$   $40^\circ\text{C}$ ) of a mixture of  $[\text{Cp}_2\text{Zr}^{13}\text{Me}][^{13}\text{MeB}(\text{C}_6\text{F}_5)]$  and  $\text{MeAl}(\text{BHT})_2$  as a function of time. Plot of the rate of disappearance of  $\text{Zr-}^{13}\text{CH}_3$  and appearance of  $\text{Al-}^{13}\text{C}$  satellites as a function of time.

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1. Chen, M.-C.; Roberts J. A. S.; Marks T. J. *J. Am. Chem. Soc.* **2004**, *126*, 4605-25.