

## Supporting Information

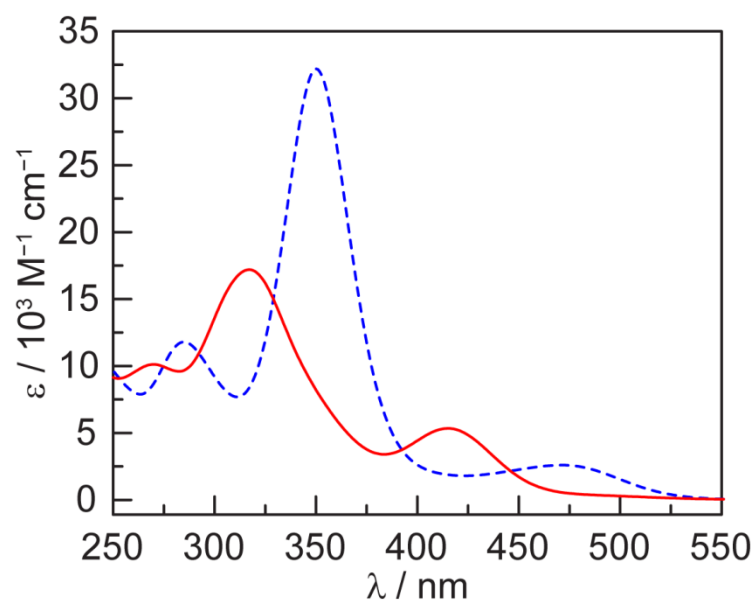
### **Mechanistic Studies of O<sub>2</sub> Reduction Effected by Group 9 Bimetallic Hydride Complexes**

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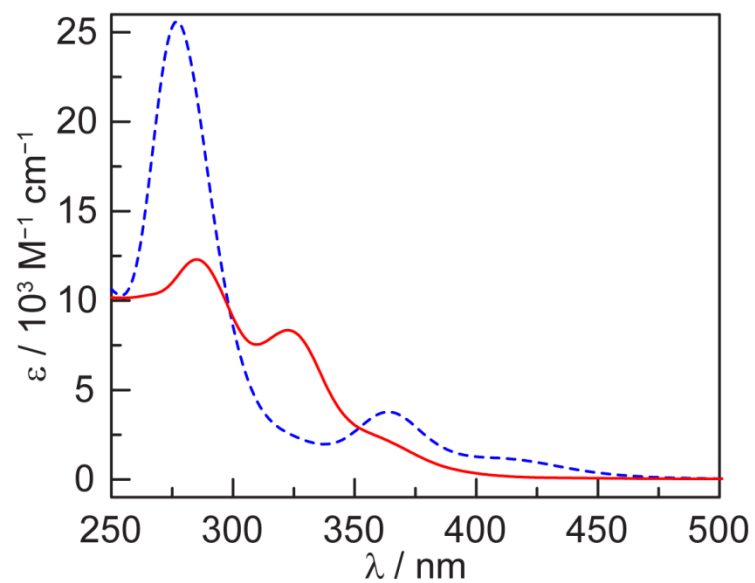
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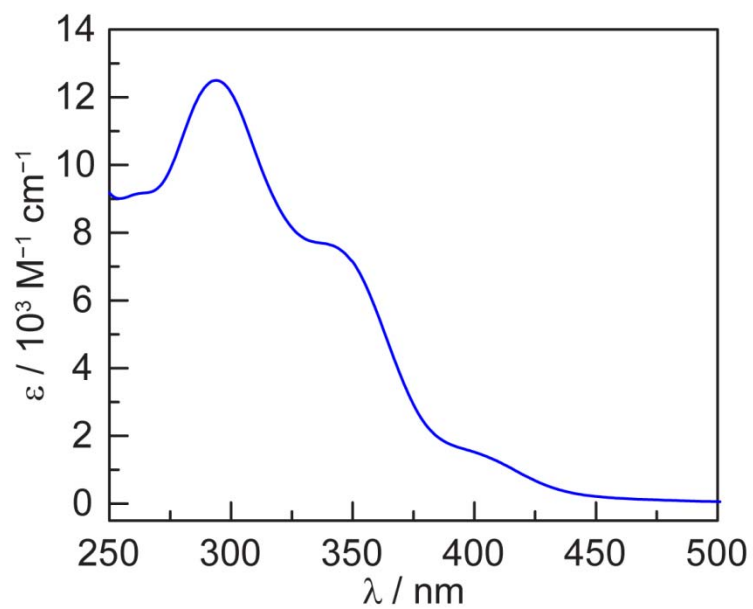
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Electronic absorption spectra of <b>2</b> , <b>3</b> , and <b>5 – 7</b> .	S2 – S3
<sup>31</sup> P{ <sup>1</sup> H} NMR spectra of <b>6</b> and <b>7</b>	S4



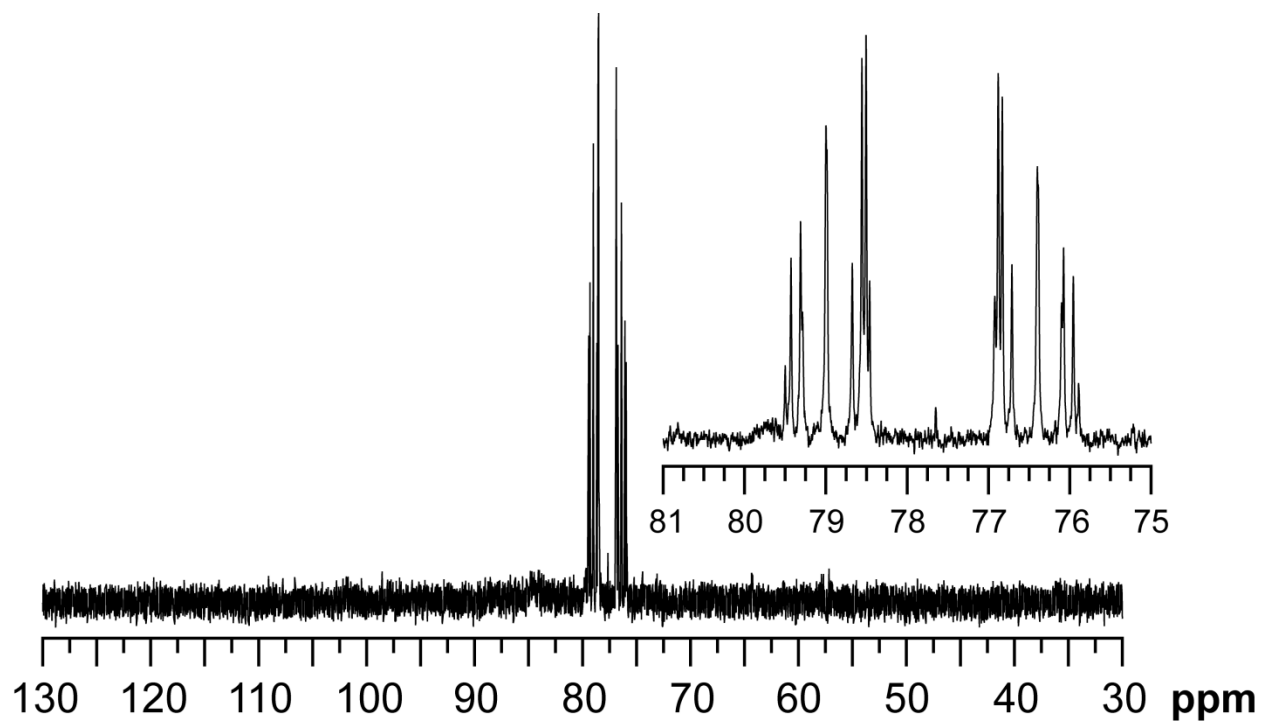
**Figure S1.** Overlaid electronic absorption spectra of **2** (—, red) and **3** (---, blue), recorded at 295 K in THF.



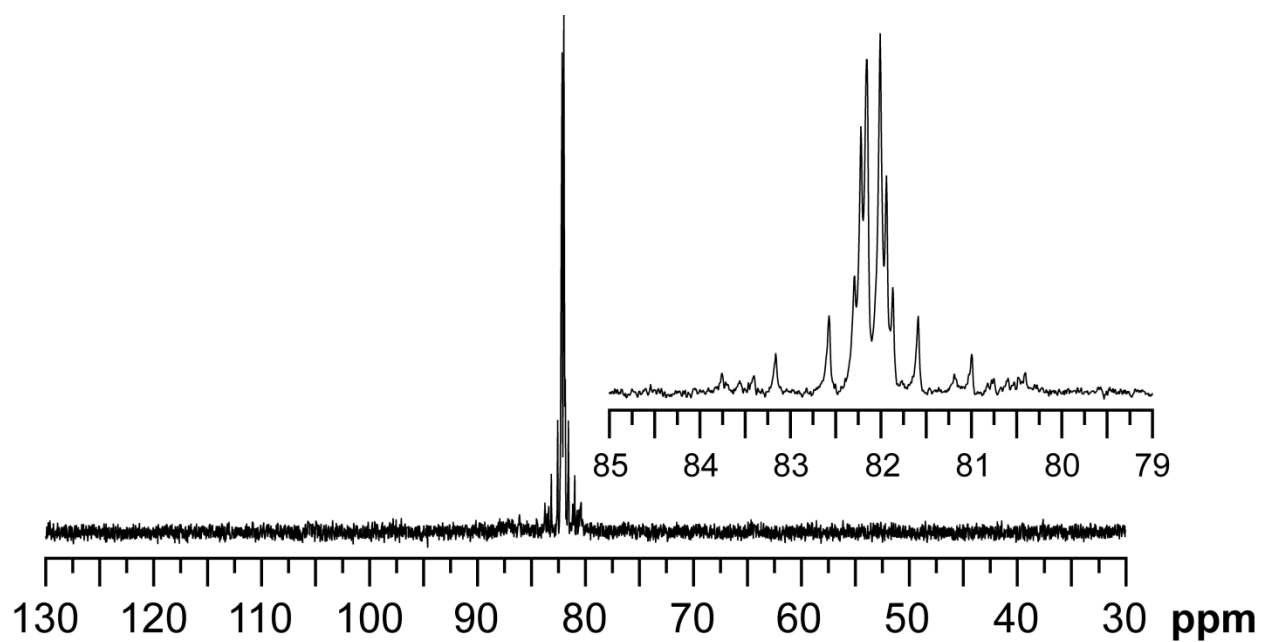
**Figure S2.** Overlaid electronic absorption spectra of **5** (—, red) and **6** (---, blue), recorded at 295 K in THF.



**Figure S3.** Electronic absorption spectrum of **7**, recorded at 295 K in THF.



**Figure S4.**  $^{31}\text{P}\{^1\text{H}\}$  NMR spectrum of **6**, recorded at 293 K and 121.5 MHz in  $\text{CD}_3\text{CN}$ . The inset shows an expansion of the spectrum.



**Figure S5.**  $^{31}\text{P}\{^1\text{H}\}$  NMR spectrum of **7**, recorded at 293 K and 121.5 MHz in  $\text{CD}_3\text{CN}$ . The inset shows an expansion of the spectrum.