Reduced Uranium Complexes with Redox-Active Ligands for Small Molecule Activation

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Redox-active ligands have been demonstrated to mediate radical chemistry typical of first row transition metal species, facilitating chemistry that is analogous to late metal counterparts. These base metals are cheap and readily available, making them attractive choices to replace more costly precious metals. Uranium is another viable alternative, as this actinide is also inexpensive, abundant, and established to mediate one electron processes. Our group has shown that electrons stored in redox-active ligands on uranium centers can be used to reduce incoming small molecules. Herein we report the synthesis of low-valent uranium species with redox-active ligands and their characterization by NMR and IR spectroscopies as well as X-ray crystallography. The reduction of small organics and the formation of uranium element multiple bonds is also reported.