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### **The Versatility of Lanthanide Metallocene Complexes: From Single-Molecule Magnets to Reactivity Studies**

#### **ABSTRACT:**

Lanthanides have been demonstrated to be especially well-suited for the design of single-molecule magnets owing to their large magnetic moments and magnetic anisotropy that stem from strong spin-orbit coupling of the 4f orbitals. By employing lanthanide ions such as Tb<sup>3+</sup>, Dy<sup>3+</sup>, and Er<sup>3+</sup> which possess intrinsically large orbital angular momentum, significantly higher spin-reversal barriers and blocking temperatures can be attained. One effective methodology to increase blocking temperatures is to generate strong magnetic exchange between lanthanide centers using radical bridging ligands. If the magnetic exchange coupling is large enough then quantum tunneling of the magnetization can be suppressed. Here, the synthesis of multiple bimetallic radical-bridged lanthanide single-molecule magnets and the effective suppression of quantum tunneling pathways using various organic and inorganic radical bridging ligands will be presented. In particular, the combination of axial magnetic anisotropy provided by the cyclopentadienyl ligands with the strong magnetic exchange coupling enabled by the inorganic N<sub>2</sub><sup>3-</sup> radical gave rise to exceptionally large magnetic hysteresis loops which remain open up to high temperatures.

#### **BIO:**

Selvan Demir studied chemistry at the University of Cologne and received her Diploma in 2007. She conducted research on scandium solid state chemistry with Prof. Gerd Meyer and scandium organometallic chemistry with Prof. William J. Evans at the University of California, Irvine earning her Dr. rer. nat. in 2010. In 2011, Selvan accepted a DAAD Postdoctoral Fellowship and began her postdoctoral research on lanthanide-based single-molecule magnets and porous aromatic frameworks with Prof. Jeffrey R. Long at the University of California, Berkeley. She was also a postdoctoral research affiliate at the Lawrence Berkeley National Laboratory working on neptunium, plutonium, and americium chemistry with Dr. David K. Shuh. Subsequently, Selvan took up a junior professorship of inorganic chemistry at the University of Göttingen. In January 2019, she moved to East Lansing and is currently an assistant professor of chemistry. Her research interests are in the areas of synthetic organometallic chemistry and magnetism.