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New separations strategies with an emphasis on recycling chemistry for high value rare earth elements

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The rare earth metals: La-Lu, Y and Sc are used in critical renewable energy applications including wind turbine generators and hybrid electric vehicles. These modern applications require pure rare earth elements that must be separated from their composite mineral sources. The supply chain of rare earths is fraught with environmentally taxing chemical problems. We have been expanding the fundamental synthetic chemistry of cerium, neodymium and dysprosium to address problems in rare earths sustainability. The accessibility of the tetravalent configuration for cerium(IV) makes that element unique among the rare earths. This redox ability underlies its simple separations chemistry from mixtures of light rare earths and enables useful one-electron oxidation chemistry for applications in organic and inorganic syntheses and heterogeneous catalysis. New strategies for accessing and stabilizing cerium(IV) compounds, with potential applications for targeted f-element separations, will be presented. A new targeted recycling strategy for neodymium and dysprosium from hard magnets will also be discussed.

Biography

Eric J Schelter as an undergraduate attended Michigan Tech where he worked with Rudy Luck to prepare low-valent rhenium compounds. He pursued graduate studies at Texas A&M with Kim Dunbar where he prepared and characterized high-spin metal-cyanide clusters. He was a Postdoc at Los Alamos National Laboratory working with Jackie Kiplinger and Kevin John on organo-actinides. He began his independent career at the University of Pennsylvania in 2009 with a focus on f-block chemistry. In 2011, he received a US DOE Early Career Award and in 2013 he was named a Cottrell Scholar. His research program at Penn focuses on the chemistry of the rare earths metals and uranium with projects in novel separations strategies, beneficiation chemistry, earth abundant catalysis and problems in electronic structure.

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