

Lessons learned from lanmodulin in the selective recognition and separation of f-block elements

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Previously thought to have no biological role, lanthanides have been shown recently to be essential enzyme cofactors in certain bacteria. Understanding the coordination chemistry underlying biological recognition of lanthanides promises to yield new strategies for the selective detection, extraction, and separation of the technologically critical rare earth elements (the lanthanides, plus scandium and yttrium). In this talk, I will describe biochemical insights my laboratory has gained into how lanthanides are selectively recognized and acquired in biological systems – including the discovery and biophysical characterization of lanmodulin, the first highly selective, natural chelator for lanthanides. I will also illustrate how we can apply the principles learned from lanmodulin to develop robust and efficient biotechnologies for separations of rare earths and actinides.