[**Elucidating the connection between rare-earth-element chelation thermodynamics and polymer structure**](https://acs.digitellinc.com/acs/live/22/page/677/5?eventSearchInput=&eventSearchDateTimeStart=&eventSearchDateTimeEnd=&eventSearchTrack%5b%5d=201#sessionCollapse394081)

[*William Archer*](https://acs.digitellinc.com/acs/live/22/page/677/5?eventSearchInput=&eventSearchDateTimeStart=&eventSearchDateTimeEnd=&eventSearchTrack%5b%5d=201) *and* [*Michael Schulz*](https://acs.digitellinc.com/acs/live/22/page/677/5?eventSearchInput=&eventSearchDateTimeStart=&eventSearchDateTimeEnd=&eventSearchTrack%5b%5d=201)

*Virginia Polytechnic Institute and State University*

Rare Earth Elements (REEs: La–Lu, Y, and Sc) are critical components for innovations in green energy and technology, therefore more effective technologies for the domestic extraction and purification of REEs are in ever-increasing demand. Metal-chelating polymers have great potential in these applications due to their relatively low cost and high affinity for target elements. However, while much research has focused on specific ligands attached to polymers, little is known about the effect of polymer architecture itself on metal chelation.
We will report on our most recent progress in the design, synthesis, and application of polymers for the selective chelation of various REEs. In addition to synthesizing a series of metal-chelating polymers, we elucidated the thermodynamics of binding using isothermal titration calorimetry (ITC) to gain insight into the specific structure-metal binding relationships of these materials. ITC enables the direct measurement of the binding affinity (Ka), enthalpy changes (ΔH), and stoichiometry of the interactions between macromolecules and metal ions in solution. By elucidating the thermodynamic profile of each chelating material, we have gained insight into each materials’ properties as a metal chelator.

