My research efforts have focused on the directed supramolecular assembly of molecular actinide (An) tectons ([AnO₂Cl₄]²⁻, An = U(VI), Np(VI), Pu(VI), for example) using non-covalent interactions, e.g. hydrogen and halogen bonds, donated by functionalized organic cations. Initial efforts focused on manipulating metal-ion speciation through careful control over synthetic conditions, which allowed for the promotion of desired structural motifs and ultimately the delineation of structure-property relationships. For example, pairing the [UO₂Cl₄]²⁻ anion with hydrogen bond donating 4-Xpyridinium cations (X = H, CH₃, etc.) provided a platform upon which uranyl luminescence was tuned via non-covalent interaction strengths. Beyond this, we have begun to establish metrics (both crystallographic and computational) to evaluate assembly, by reconciling non-covalent interaction (NCI) pairings and structural motifs, and also by quantifying the strengths of the NCIs to develop a ranking scheme or hierarchy of interaction types. In total, these efforts have brought supramolecular assembly concepts utilized elsewhere on the periodic table to the 5f block and have resulted in the synthesis and crystallographic characterization of 41 novel An compounds with various compositions. Looking ahead, I intend to extend my synthetic efforts to generate uranyl containing framework materials with targeted topologies and photocatalytic behavior as future work in this arena is supported by a post-doctoral fellowship at Pacific Northwest National Laboratory. Such materials, when irradiated with UV or visible light, have the potential to degrade organic species that are detrimental to nuclear waste processing and/or remediation schemes.