

## Abstract

The aim of this thesis is to synthesize new kind of macrocyclic ligands for complexation of  $Zr^{4+}$ . Zirconium(IV) complexes have potential as contrast agents in immuno-PET. Three macrocyclic ligands **L1**, **L2** and **L3** with different pendant arms (HOPO, maltol, hydroxamate) were designed. Despite numerous attempts syntheses of **L1** and **L2** were unsuccessful. Ligand **L3** was synthesized and the protonation constants were determined by potentiometric titration. Complexes  $[Zr^{4+}(\mathbf{L3})]$  were studied too. Catechol ligand **L4** was prepared and complexes with cations  $Zn^{2+}$ ,  $Ga^{3+}$  and  $Zr^{4+}$  were investigated.