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### Inorganic-Analytical-Radiochemistry

Our research group is doing work on the inorganic and analytical chemistry of the lanthanide (rare earth) elements, particularly lutetium. We are also conducting radiochemical investigations on the use of radioactive recoil to produce molecular change. Active research projects include the following:

1. Lanthanide chemistry
  - a. lanthanide separations by solvent extraction
  - b. development of 80-stage countercurrent solvent extraction apparatus
  - c. removal of ppm impurities from the lanthanides
  - d. reduction of trivalent Eu, Yb, and Sm in aqueous and non-aqueous solutions
  - e. ICP-MS determinations of ppt impurities in lanthanides
  
2. Lutetium chemistry
  - a. X-ray and optical properties of  $\text{Lu}_2\text{OSiO}_4$  crystals
  - b. effects of crystal doping upon scintillation characteristics of  $\text{Lu}_2\text{OSiO}_4$
  - c. analysis of doping agents in  $\text{Lu}_2\text{OSiO}_4$
  - d. production of 5-nines and 6-nines pure  $\text{Lu}_2\text{O}_3$
  - e. effects of oxidation and reduction on scintillation properties of  $\text{Lu}_2\text{OSiO}_4$
  - f. recovery of lutetium from scrap materials from  $\text{Lu}_2\text{OSiO}_4$  processing
  - g. redox removal of ytterbium to enhance purification of lutetium
  
3. Radiochemistry
  - a. imbedding of radioactive species in  $\text{C}_{60}$  and porphorins by recoil
  - b. redox reactions resulting from radioactive recoil
  - c. separation of actinide species for medical usage
  - d. thermodynamics of metal atoms and small clusters as compared to bulk metals

Work in lanthanide chemistry is conducted in laboratories at UT. These investigations are supported by Siemens-CTI. The radioactive experimentation is carried out at the Oak Ridge National Laboratories in conjunction with Dr. Saed Mirzadeh of the Nuclear Science and Technology Division, and is funded by the DOE.

All inquiries about the possibility of joining our research group are invited. Details of the above projects will be gladly provided by GKS and/or the research students who are working on the projects.