SYNTHESIS AND DEVELOPMENT OF NEW APPLICATIONS FOR LANTHANIDE COMPOUNDS

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Lanthanide compounds exhibit interesting chemical, biological, catalytic properties, etc. Actually they have been used in a variety of purpose. The obtention of highly pure materials is one focus of our research and other is the design and developing of new materials based on rare earths compounds with new properties and their application. Taking this way as target, our group has been work focalizing our efforts on two principal areas of research: Rare earth separation and recovery and Development of new rare earth luminescent materials and application. Lanthanide separation and recovery. In this topic they are included the follow activities:

1) Use of dialysis for the rare earth's fraction with interesting results. In this area it also was studied the separation of inorganic acids with cellophane membrane;

2) Studies to the separation of yttrium from the other rare earths, using ionic exchange, and bulk material that is a concentrated of rare earths, named LCC (low cerium carbonate) in stock in IPEN;

3) Studies for lanthanium separation using a rare earth concentrated and it application as oxide stabilizer used as catalyst, in process like alumina. The lanthanium is separated and recovered as acetate; it is used in this chemical form to impregnate the alumina spheres, obtaining a doped alumina with lathanium that is used for catalytic application;

4) Studies on the separation of f elements using the concept of molecular recognition (supramolecular chemistry) and new intelligent molecules as extractor agents attached to process as supported liquid membranes and affinity chromatography has been also doing.

Development of new rare earth luminescent materials and application. The electronic properties of lanthanide ions, such as Eu^{3+}, Tb^{3+}, Dy^{3+}, and Sm^{3+} make them well equipped to function as labels in fluorescence microscopy bioassays, luminescent probes, owing to their long radiative lifetimes relative to background fluorescence, sharp emission bands, and large Stokes shifts. New compounds as b-diketonate ,carboxilates, etc based on antenna ligand principle are being developed and studied. Synthesis of ligand analogs coupled with excited state calculations are being due to gain a better understanding of the electronic and structural requirements of the system and to learn how best to optimize it. This kid of materials have been used in several experiments in our group as: developing of luminescent markers, magnetic-luminescent films to be used in biologic sensor, detection of biological substrates, as PSA, protein markers, DNA hybridization; development of materials with semiconducting properties based on tin oxide doped with rare earth for photonic use. (FIG.1) Homogeneous Immunoassays using lanthanide probe.

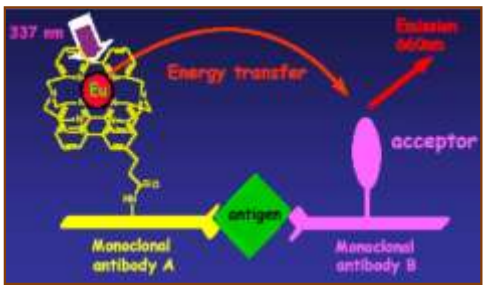

FIGURE 1 - Homogeneous Immunoassays using lanthanide probe.