

SCIENCE SEMINAR

THE DEPARTMENT OF CHEMISTRY AND PHYSICS



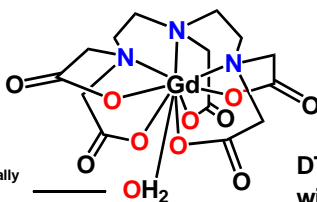
Date: **October 26, 2005** (Wednesday)
Time: **3:00 PM**

Place: **Oxendine Science Building,
Room 3231**

*Title: "Design of ligands
for complexation of metal ions
in medical applications"*

Speaker: **Dr. Robert D. Hancock**
DeLoach Professor of Chemistry
UNC-Wilmington.

ABSTRACT: Metal ions find wide applications in medicine. The first such application was the use of cis-platin, a complex of platinum for the treatment of cancer. The radiodiagnostic metal ^{99m}Tc is widely used for clinical diagnosis. The metal ion Gd(III) is used in MRI (Magnetic Resonance Imaging) where it relaxes the spin of the proton in water in body tissues, and acts as a contrast agent that produces clearer images. Gd(III) is itself toxic, and must be bound in a ligand that prevents its escape into the body. The ability of the Gd(III) complex to relax the water is dependent on the numbers of waters bound to the Gd(III).



The most the water molecule chemically bound to the Gd³⁺ ion **DTPA complex with Gd³⁺** widely used ligand for binding Gd(III) in MRI applications is DTPA (diethylene-triaminepentacetic acid). The Gd(III) has nine coordination sites, eight of which are occupied by the DTPA, which leaves room for only one water molecule. The design target is that 1) the ligand must have enough binding strength to prevent the toxic Gd(III) from escaping into the body, but 2) the more water molecules are directly bound to the Gd(III), the more strongly it will relax the MRI signal. To date, complexes with fewer than eight donor-atoms have not bound the Gd(III) strongly enough, and so only one water molecule is present. In this talk, the design of new ligands with only four donor atoms that bind the Gd(III) strongly enough, with five water molecules bound to the Gd(III) are described.