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RESEARCH AREA

The "Rare earth metal research group" is mainly concerned with the coordination chemistry of metal ions (alkaline earth, rare earth, some transition and metal ions of major group 13) that are important from a biological point of view (essential and toxic) and can be utilized in medical imaging diagnostics (e.g. magnetic resonance imaging (MRI), positron emission tomography (PET), etc.) and therapy (nuclear medicine). We synthesize open-chain and macrocyclic polyaza-polycarboxylate, polyphosphonate, polyphosphinate, picolinate, amidate and more recently 8-oxycholate chelators, their complexes of metal ions, and study their physico-chemical properties (equilibrium, formation and dissociation kinetics, contrast enhancement ability etc.) and structure. More recently, we are working on the design, synthesis and characterization of ligands those complexes can act as "smart" or bimodal (MRI - PET, MRI - optical, etc.) probes.

TECHNIQUES AVAILABLE IN THE LAB

As far as the applied techniques concerned, we use pH-potentiometry (equilibrium measurements), UV-visible spectrophotometry (equilibrium and kinetic measurements), spectrofluorimetry (equilibrium and kinetic measurements), as well as on one- and multidimensional and TD NMR (¹H, ¹³C, ¹⁷O and ³¹P), mass spectrometry and HPLC (analytical and preparative) techniques.

SELECTED PUBLICATIONS

Toàn, N. M., Vágner, A., Nagy, G., Ország, G., Nagy, T., Csikos, Cs., Várad, B., Sajtos, G. Z., Kapus, I., Szoboszlai, Z., Szikra, D., Trencsényi, Gy., **Tircsó, Gy.**, Garai, I. (2024) Mn-BPPA-Trastuzumab: A Promising HER2-Specific PET Radiotracer, *J Med Chem* **10**: 8261–8270.

Botár, R., Molnár, E., Garda, Z., Madarasi, E., Trencsényi, Gy., Kiss, J., Kálmán, F. K., **Tircsó, Gy.** (2022) Synthesis and characterization of a stable and inert Mn(II)-based Zn(II) responsive MRI probe for molecular imaging of glucose stimulated zinc secretion (GSZS)†. *Inorg Chem Front* **9**: 577–583.

Csupász, T., Szücs, D., Kálmán, F. K., Hollóczki, O., Fekete, A., Szikra, D., Tóth, É., Tóth, I., **Tircsó, Gy.** (2022) A New Oxygen Containing Pycen-Type Ligand as a Manganese(II) Binder for MRI and ⁵²Mn PET Applications: Equilibrium, Kinetic, Relaxometric, Structural and Radiochemical Studies. *Molecules* **2**: 371.

Kálmán, F. K., Nagy, V., Várad, B., Garda, Z., Molnár, E., Trencsényi, Gy., Kiss, J., Mème, S., Mème, W., Tóth, É., **Tircsó, Gy.** (2020) Mn(II)-Based MRI Contrast Agent Candidate for Vascular Imaging. *J Med Chem* **11**: 6057–6065.

Botár, R., Molnár, E., Trencsényi, Gy., Kiss, F. J., Kálmán, K., **Tircsó, Gy.** (2020) Stable and Inert Mn(II)-Based and pH-Responsive Contrast Agents, *J Am Chem Soc* **4**: 1662–1666.