XXI Brazilian Meeting on Inorganic Chemistry
X Brazilian Meeting on Rare Earths
III Workshop on Theoretical Bioinorganic Chemistry
Belo Horizonte, September 12 - 15th 2024

# Synthesis and Characterization of Europium(III) Complexes with Mixed-Ligands: Investigation of Cytotoxicity and Interactions with Biomolecules

**Josias S. Rocha [1], George B.S. Pereira[1], Dario B. Fortaleza[1], Tamara Teixeira[1], Marcos V. Palmeira[1], Pedro O. H. Santiago[2], Javier Ellena[2] and Fillipe V. Rocha[1].**

*[1]Departamento de Química, Universidade Federal de São Carlos, São Carlos, São Paulo, CEP 13565-905, São Carlos, São Paulo, Brazil.*
*[2] Instituto de Física de São Carlos, Universidade de São Paulo, Avenida Trabalhador São-Carlense 400, São Carlos, São Paulo, CEP 13566-590, São Carlos, São Paulo, Brazil.*
*E-mail: josias135034@gmail.com*

**Thematic Area**: (Biological Inorganic Chemistry)

**Keywords**: Europium Complexes, Cancer, Biomolecules Studies

Cancer is a group of diseases characterized by the uncontrolled development of transformed cells. There are various treatments to combat the disease, and, in most cases, chemotherapy is necessary, but it still has severe side effects for patients. In view of this, the search for new drugs that can act by different mechanisms is of the utmost importance [1]. In this respect, four europium(III) complexes were synthesized with DBM= Dibenzoylmethane type ligands and different phenanthrolines, which were characterized using various techniques, such as UV-Vis, IR, NMR (via $^1$H and 2D techniques), molar conductivity, magnetic susceptibility, CHN, fluorescence, and X-ray diffraction. Regarding their interactions with classical biomolecules such as DNA, these compounds showed possible interactions via DNA grooves or electrostatics. This was evidenced by slight changes in UV-Vis and circular dichroism (CD) spectra, with intermediate binding constants ranging from 1.17 to 4.65x10$^5$M$^{-1}$. Additionally, all compounds were able to quench the fluorescence of the dye Hoechst 33258 when bound to DNA.
The complexes also demonstrated significant inhibition of the enzymes topoisomerases IIα and Iβ at 20 µM, suggesting their potential role as catalytic inhibitors, as they did not interact with the IIβ isoform. Furthermore, the complexes showed promising $IC_{50}$ results in cisplatin-resistant ovarian cells (A2780cis), as shown in Figure 1.

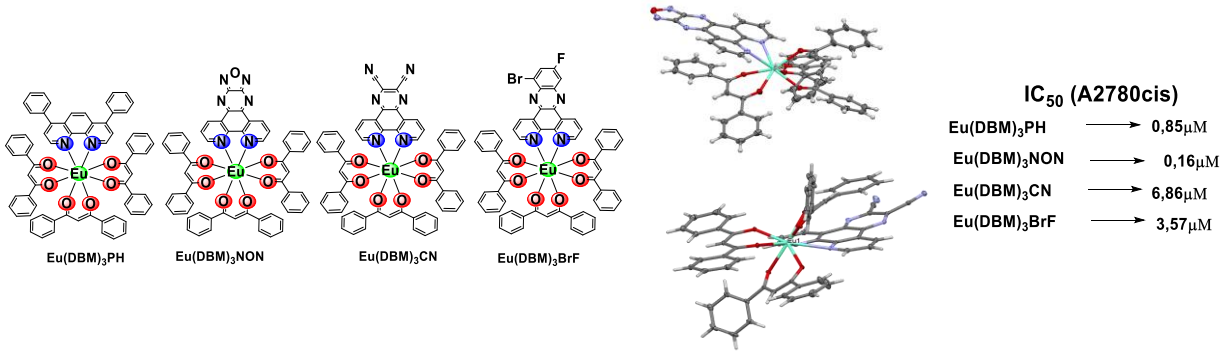


Figure 1. Proposed structure of the complexes, X-ray (single crystal), and $IC_{50}$ towards ovarian cancer cell line.

**Acknowledgments:** CAPES, CNPq (401681/2023-8), and FAPESP (2022/02876-0).

## References

[1] J.S. Rocha *et al*, Inorg. Chem. Commun. **131** (2021).