

## MAGNETO-OPTICAL PROPERTIES OF LANTHANIDE-FLAVONOIDS BASED METAL ORGANIC HYBRID MATERIALS IN DIAGNOSTIC MEDICINE

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### ABSTRACT

Metals play pivotal roles in nutrients and medicines, and provide chemical functionalities that are not accessible to purely organic compounds [1]. More specifically, lanthanides, also known as “rare earth elements”, give rise to complex compounds through chelation with organic ligands. A select group of such materials find extensive use as therapeutic agents, because their fingerprint luminescence and MRI signals are highly useful for real-time monitoring of drug delivery and therapeutic processes [2]. On the other hand, flavonoids are a structurally distinct class of natural products with a variety of pharmaceutical and medicinal applications, due to their anti-oxidant, anti-inflammatory, anti-mutagenic, and anti-carcinogenic properties, coupled with their capacity to modulate key cellular enzyme function [3]. The main objective of this work is to develop innovative ternary molecular metal-organic complex materials with improved properties beyond those of the parent components. The so envisioned materials are anticipated to have potential applications in sensor technology and the diagnosis/treatment of diseases, including among others various forms of cancer and diabetes. The aspired ternary lanthanide-flavonoid-(N,N-organic chelator) compounds consist of a lanthanide atom center, organic flavonoid molecules of specified structure and biological activity of natural origin, and an auxiliary ternary organic chelator (N,N-organic ligand). In an effort to pursue the aforementioned materials, synthetic efforts were launched in our Lab, employing lanthanides, such as Neodymium(III), Europium(III), and Lanthanum(III), in this particular study, further supplemented with Chrysin (Chr) (representative flavonoid) and 1,10-phenanthroline as a ternary aromatic chelator ligand. The synthetic approach, under strict molecular stoichiometry and solvent conditions, led to the ternary compounds Nd-Chr-phen, Eu-Chr-phen and La-Chr-phen, which were isolated and subsequently characterized through elemental analysis, X-ray crystallography, Fourier Transform Infrared Spectroscopy (FT-IR), Ultraviolet-Visible Spectroscopy (UV-Visible), Luminescence spectroscopy, and Electrospray Ionization Mass Spectrometry (ESI-MS). Further theoretical work on the well-defined materials has led to the discovery of intra- and inter-molecular interactions justifying structure reactivity correlations in the solid state. The collective data exemplify a well-defined physicochemical profile of the arising materials and justify further inquiry into future applications in sensor technology and imaging exploitation in theranostics.

[1]

**KEYWORDS:** Metallodrugs, Lanthanides, Flavonoids, Hybrid materials

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