

## Structure activity relationship of imidazo[4,5-*f*] ligands and their Rhenium(I) complexes- photoluminescence and DNA intercalation

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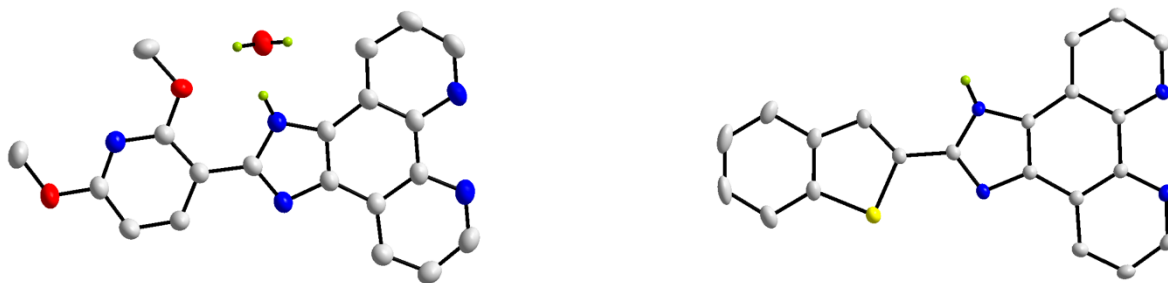
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Photodynamic therapy (PDT) involves the treatment of a patient with a non-toxic photosensitiser. Upon irradiation by an external light source (600-850 nm)[1,2], the photosensitiser causes the production of singlet oxygen radicals at the tumour site which in turn provokes destruction of the tumour and so arousing significant interest as a potential cancer treatment.[3] Notably, a range of Rhenium(I) tricarbonyl complexes were found to induce cell death in a manner recognisably different to that of *cisplatin* and overcome *cisplatin* resistance in several resistant cell lines.[4,5]

It has become apparent that 1,10-phenanthroline moieties show favourable fluorescence for the detection of metal ions.[6] Sensors based on the 1,10-phenanthroline moiety coordinated to various metal ions have resulted in compounds exhibiting strong fluorescent properties. El-Awady *et al.* reported the effects of imidazopyridine derivative binding to DNA. They found that this introduction resulted in apoptosis in lung and breast cancer cells.[7] Thapa *et al.* synthesised a range of phenanthroline-type derivatives. Structure-activity relationship studies of these phenanthroline-type derivatives confirmed the importance of a [2,2';6,2'']-terpyridine skeleton for cytotoxicity toward several cancer cell lines.[8]

A range of imidazo[4,5-*f*]-1,10-phenanthroline type ligands were synthesised and coordinated to Rhenium(I) yielding compounds of the general formula  $[\text{Re}(\text{CO})_3(\text{N},\text{N}')(\text{H}_2\text{O})]^+$  where N,N' is the imidazo[4,5-*f*]-1,10-phenanthroline type ligand. These ligands and complexes were characterised by multinuclear NMR spectroscopy and IR Spectroscopy. X-ray crystallography data has been obtained for several ligands thus far. The photoluminescent, as well as the DNA binding capacity to calf thymus DNA were studied.



**Figure 1.** Crystal structure of the imidazo[4,5-*f*]1,10-phenanthroline type ligands, (2,6-dimethoxypyridyl)imidazo[4,5-*f*]1,10-phenanthroline and (benzo[*b*]thiophene)imidazo[4,5-*f*]1,10-phenanthroline.

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**Keywords:** Photodynamic therapy; Rhenium; Fluorescence; 1,10-phenanthroline; Structure activity relationship

*This work is based on the research supported wholly by the National Research Foundation of South Africa.*