Title of the Thesis: "**Stilbene-Conjugated Terpyridine Complexes of Ru(II) and Os(II): Experimental and Theoretical Investigations on Photophysics, Trans-Cis Photoisomerization, Ion Sensing, and Aggregation-Induced Emission Characteristics**".

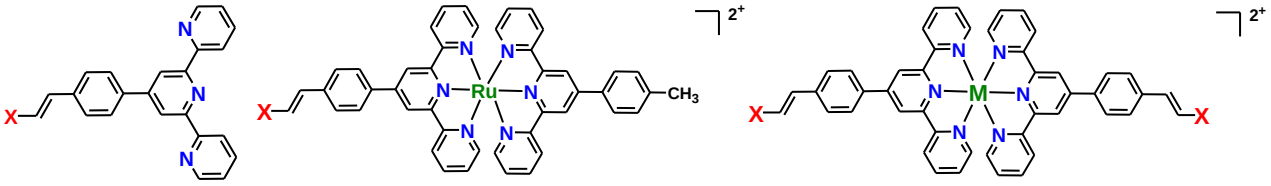
Submitted by: **Smt. Tanusree Ganguly**
Department of Chemistry
Jadavpur University
Kolkata - 700032

Index No. **233/18/Chem./26**

Abstract

This thesis deals with a series of homo- and heteroleptic Ru(II) and Os(II) complexes incorporating styrylbenzene conjugated terpyridine ligands of the type, tpy-pvp-X, where X = naphthalene, anthracene and pyrene moiety. All the liagnds and their metal complexes were synthesized and thoroughly characterized by standard analytical tools and spectroscopic techniques. The photophysical properties of all these complexes were studied via absorption and both steady state and time resolved emission spectroscopy. Electrochemical as well as spectroelectrochemical behaviors of the complexes were also investigated. The RT emission features of both the ligands and metal complexes were modulated via aggregation induced emission enhancement (AIE) or quenching (ACQ), by judicious employment of binary solvent mixtures. Taking advantage of the strylbenzene moiety, *trans-cis* photoisomerization behavior of the complexes was thoroughly studied upon irradiating with visible and UV lights. The kinetic parameters of the isomerization process were also estimated. Modulation in the rate and quantum yield of photoisomerization was done with respect to variation of the electronic nature of the substituent (X), via the use of chemical oxidant and reductant as well as through aggregation. The metal complexes were also able to sense selected cation and anion via various non-covalent interactions such as hydrogen bonding, CH-π, anion-π and cation-π. Theoretical investigations including DFT and TDDFT methods were also performed for all the systems to get insight about their electronic nature and for proper assignments of experimentally observed spectral bands, as well as to elucidate the mode of ion-receptor interactions.

The thesis is comprised of seven chapters and consists of 293 pages.



Tanusree Ganguly

Sujoy Baitalik
Professor Sujoy Baitalik
Department of Chemistry
Jadavpur University
Kolkata- 700 032, India