Preface

Everything should be as simple as it is
but not simpler.

~Albert Einstein

In recent years the combination of liquid crystalline properties exhibited by anisotropic organic molecules and the electronic or magnetic properties of d-block or f-block metals yielded compounds with a wide variety of physical properties. The aim of combining the unique properties of anisotropic fluids, in particular electrical and optical properties of the liquid crystalline materials and the distinct properties of metals, in particular electronic and magnetic properties of the metal, in the design and synthesis of novel metal containing liquid crystals or metallomesogens is the prime target of this thesis.

A general introduction of liquid crystal along with the classification of different types of liquid crystals was included in the chapter 1 of the thesis. This chapter also includes identification of various types of phases and the orientation of the molecule within the layer. The importance Schiff bases, metallomesogens and banana shaped liquid crystal were also discussed here. Chapter-2 contains literature survey, where major work on the metallomesogens was copied. Different types of ligand coordinated with d and f-block metal complexes synthesized so far and their liquid crystalline property was discussed in details. This chapter also gives an idea about the current research work on the binuclear and organometallic metallomesogens. Chapter-3 is the experimental part, where all the synthetic procedures are describe along with all analytical and spectroscopical data.

Chapter -4 of the thesis deal with synthesis of new mono and binuclear copper complexes derived from Schiff bases viz., N(4-n-alkyloxy salicylidene)-4'-n-alkylanilines are carried out and their structure and liquid crystalline properties have been investigated. The ligands exhibit rich polymesomorphism; mono nuclear complexes exhibit smectic A, smectic C and smectic E phases, while the binuclear
complexes mostly exhibit viscous smectic A phase. Chapter 5 includes a comparative study between N(4-n-alkyloxysalicylidene)-4'-n-alkylanilines and N(4-n-alkyloxysalicylidene)-4'-n-alkyloxyanilines and their copper and oxovanadium complexes. This study revealed that, presence of extra oxygen atom not only elevated the melting and isotropic temperature but also alter the phase behavior of all the ligand and metal complexes. Chapter 6 of the thesis deal with lanthanide complexes (Tb(III), Dy(III), Gd(III)) of N-aryl based Schiff bases exhibiting mesomorphism have been synthesized and characterized. The cross over phenomena of calamitic lamellar to discotic columnar phase behaviour was observed in some of these complexes. This was further confirmed by the X-ray study. All of these complexes exhibit fluorescence property along with the ligands. In the final chapter 7, the effect of the polar substituent on the dinuclear ortho-palladated complex derived from azo-based ligand was investigated. Most of the acetate-bridged complexes are found to be non-mesogenic whereas all the chloro-bridged complexes are mesogenic in nature. Chloro-bridged complex has much higher thermal stability than those of acetate-bridge complex and azo-based ligand.