"*Our imagination is the only limit to what we can hope to have in the future*."

- *Charles F. Kettering*

This thesis has been mainly focused on the synthesis, characterization and properties of different types of organic-inorganic hybrid solids based on cobalt, copper and molybdenum. The work presented in this thesis opens up several new opportunities. A few of them are listed below.

- Most hybrid solids in this work were synthesized by solvent evaporation method at ambient conditions which was more time consuming. However, various other methods like hydrothermal, layer diffusion, sonication method, etc. can also be tried for the self-assembly of hybrid solids which may result in new materials with improved properties.
- In Chapter II it was found that Anderson-Evans type POM solids can be used for preparing pyrrole polymer composite materials. In continuation of this work, a different molybdenum source, APM was also tried for preparing polymer composites in chapter VI which showed potential as acid-base indicator to be used in titrations. There is more scope for further investigation of other properties and applications such as sensing of metal ions and biomolecules of such novel composites. Several POM hybrids are reported to be excellent photocatalysts in various reactions. Hence, the synthesized POM cluster hybrids and composites can also be explored for its photocatalytic activity.
- Research on hybrid compounds belonging to the class of transition metal complexes is extensive. In Chapter III, Co(II) complexes with 2-aminopyrazine were screened for its antibacterial activity, whereas in Chapter IV, Cu(II) complexes with isomeric aminopyridines were explored for the chromotropic

phenomena. Further studies (*in vitro* and *in vivo*) can be done to investigate the potential of the above metal complexes as antioxidant, antiviral and anticancer drugs. In addition, aminopyrazines and aminopyridines can also be combined with other transition metal ions to form new complexes with novel properties.

- In chapter V, CTAB templated PMO hybrids were found to be effective adsorbent for removing cationic dyes from aqueous solution. Such surfactant templated nanostructures provide scope for investigating other applications such as catalytic and chromogenic materials and also in biomedical field.