

# Abstract

This thesis focuses on the synthesis by soft voice and hydrothermal voice; the structural characterization by x-ray diffraction on powder and monocrystal and by different spectroscopic methods, as well as by thermal analyzes and the study of photoluminescent and magnetic properties of new coordination complexes of metals of transition.

During this work, we have obtained :

- ✚ Two new isostructural mononuclear coordination complexes of Cd<sup>(II)</sup> and Zn<sup>(II)</sup> with general formulas
  - [Cd (H<sub>2</sub>O)<sub>2</sub> (2,20-dpa)<sub>2</sub>] [tcnopr]<sub>2</sub>
  - [Zn (H<sub>2</sub>O)<sub>2</sub> (2,20-dpa)<sub>2</sub>] [tcnopr]<sub>2</sub>
  
- ✚ Three new polynuclear coordination complexes of Cd<sup>(II)</sup> and Zn<sup>(II)</sup>; two of them are isostructural with general formulas :
  - [Cd (H<sub>2</sub>O)<sub>2</sub> (4,4'-bpy) (tcnopr)<sub>2</sub>]
  - [Zn (H<sub>2</sub>O)<sub>2</sub> (4,4'-bpy) (tcnopr)<sub>2</sub>]
  - [Cd (H<sub>2</sub>O)<sub>2</sub> (4,4'-bpy) (tcnoet)<sub>2</sub>]

Fluorescence analysis showed that all the complexes show moderate to weak blue, cyan, and green light emission only the complex [Cd (H<sub>2</sub>O)<sub>2</sub> (4,4'-bpy) (tcnoet)<sub>2</sub>] (I) exhibits strong cyan light emission. These light emissions are attributed to the charge transfer interaction  $\pi-\pi^*$

- ✚ A two-dimensional coordination polymer of Cu (II) of the formula [(CuN<sub>3</sub> (H<sub>2</sub>O))<sub>2</sub> (adp)]<sub>n</sub>; the structure shows a Cu (II) chain with three different symmetrical bridges, namely the azide anion, water and carboxylate. The study of the magnetic properties on the copper polymer revealed that it exhibits moderate intra-chain ferromagnetic interactions with the coupling constant:  $J_{\text{chain}} = +38.4 \text{ cm}^{-1}$

**Keywords:** Polynitrile ligands, Carboxylate and azide ligands; Transition metals, X-ray diffraction on single crystal, ATG / ATD, Hirshfeld surfaces, Magnetic and luminescent properties.