

## Two dimensional heteronuclear complexes with cyanide and 4-aminomethylpyridine ligands



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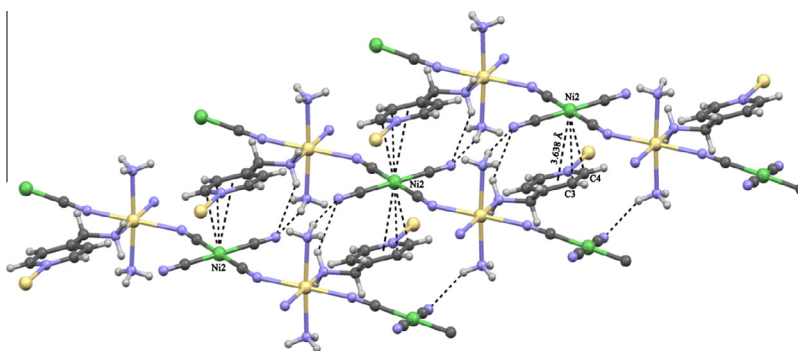
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### HIGHLIGHTS

- The complexes were synthesized and characterized by FT-IR and Raman spectroscopy.
- The crystal structures were investigated by single crystal X-ray diffraction technique.
- Ni(II) or Pt(II) ions are coordinated in square planar geometry.
- Cd(II) ions are coordinated in distorted octahedral arrangement.
- $M \cdots \pi$  interactions have observed between the M(II) ions and pyridine rings.

### GRAPHICAL ABSTRACT

In this study, we define syntheses, spectral (FTIR and Raman), thermal and elemental analyses of the complexes  $[\text{Cd}(\text{NH}_3)_2(\mu\text{-ampy})\text{Ni}(\mu\text{-CN})_2(\text{CN})_2]_n$  (**1**) and  $[\text{Cd}(\text{H}_2\text{O})_2(\mu\text{-ampy})\text{Pt}(\mu\text{-CN})_2(\text{CN})_2]_n$  (**2**) (ampy = 4-aminomethylpyridine). The crystal packing of the complexes are a composite of intermolecular hydrogen bonding and  $M \cdots \pi$  interactions. The non-covalent  $M \cdots \pi$  binding force between the M(II) ions and pyridine rings are very important in stabilizing of polynuclear structure of the complexes.



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### ABSTRACT

Two new cyano-bridged two-dimensional heteronuclear complexes,  $[\text{Cd}(\text{NH}_3)_2(\mu\text{-ampy})\text{Ni}(\mu\text{-CN})_2(\text{CN})_2]_n$  (**1**) and  $[\text{Cd}(\text{H}_2\text{O})_2(\mu\text{-ampy})\text{Pt}(\mu\text{-CN})_2(\text{CN})_2]_n$  (**2**) (ampy = 4-aminomethylpyridine), were synthesized and characterized by FT-IR and Raman spectroscopic, thermal (TG, DTG and DTA) and elemental analyses and single crystal X-ray diffraction techniques. They crystallize in the triclinic system and P-1 space group. The Ni(II) or Pt(II) ions are four coordinate with four cyanide-carbon atoms in a square planar geometry and the Cd(II) ion exhibits a distorted octahedral coordination by two different N-atoms from two symmetrically equivalent ampy ligands, two ammine or aqua ligands and two bridging cyano groups. The most important features of the complexes are the presence of obvious  $M \cdots \pi$  ( $M = \text{Ni(II)}$  or  $\text{Pt(II)}$ ) interactions.

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### Introduction

The design and synthesis of polymeric cyano bridged metal complexes has received much attention in recent years due to their

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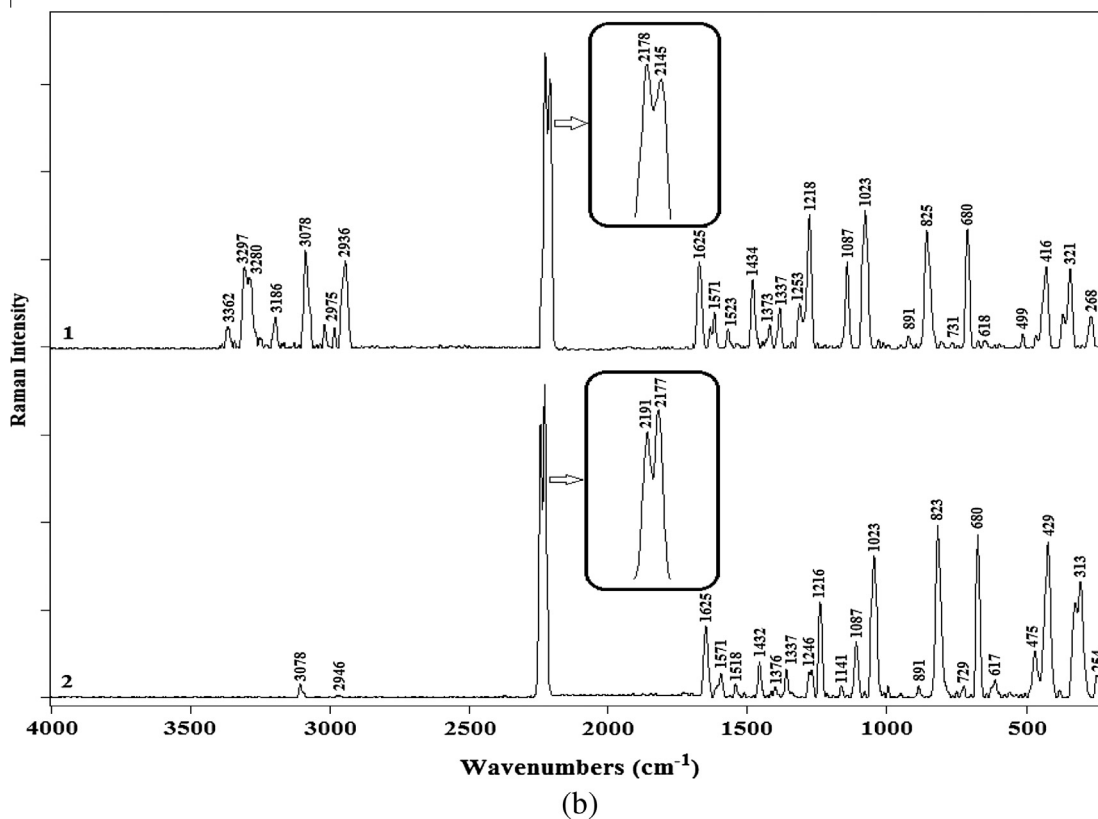
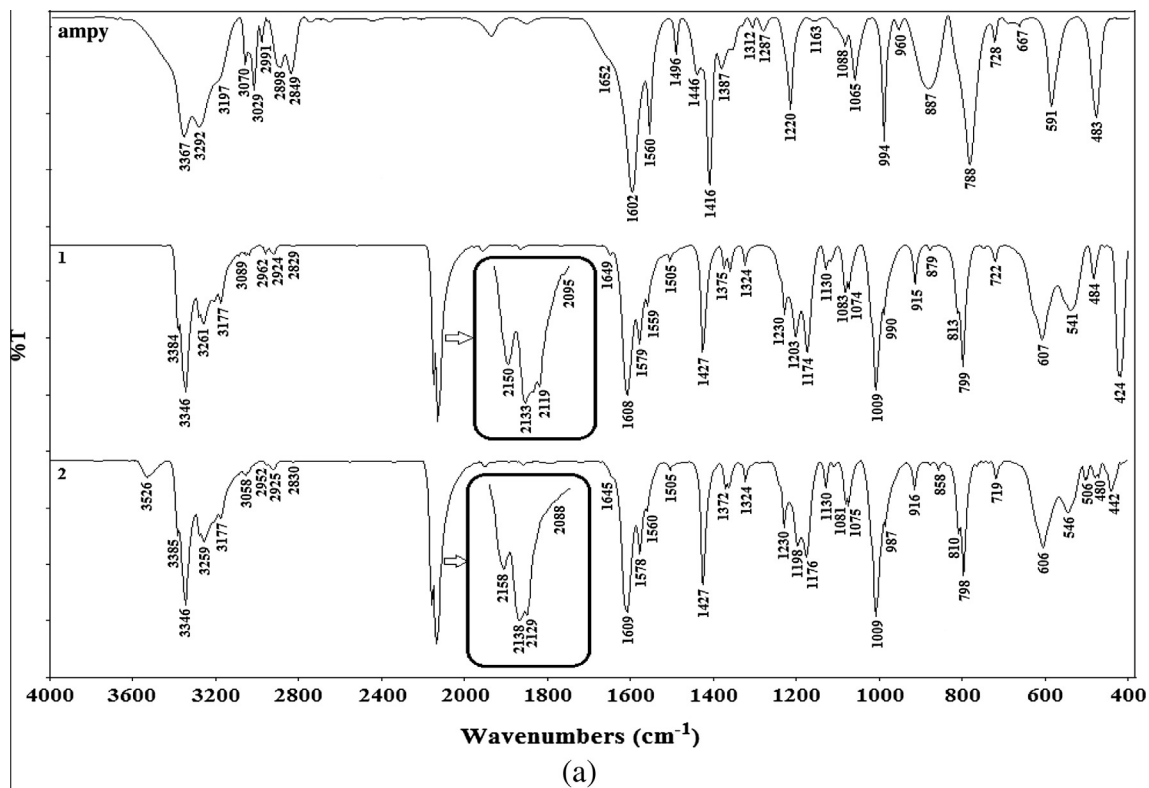


Fig. 1. FT-IR (a) and Raman (b) spectra of the complexes.

interest in the fields of magnetic [1–3], electrochemical [4], spin-crossover phenomena [5–7], and microporous features [8,9]. These polymeric metal complexes are especially macromolecules formed by metal–metal or metal–ligand–metal bridge connections

in one, two or three dimensions [10–12]. One-dimensional (1D) coordination compounds based on cyano complexes are intensively studied at present due to their interesting magnetic properties [13–16].

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