

# Structural and Electrochemical Studies of Cobalt(II) and Nickel(II) Coordination Polymers with 6-Oxonicotinate and 4,4'-Bipyridine

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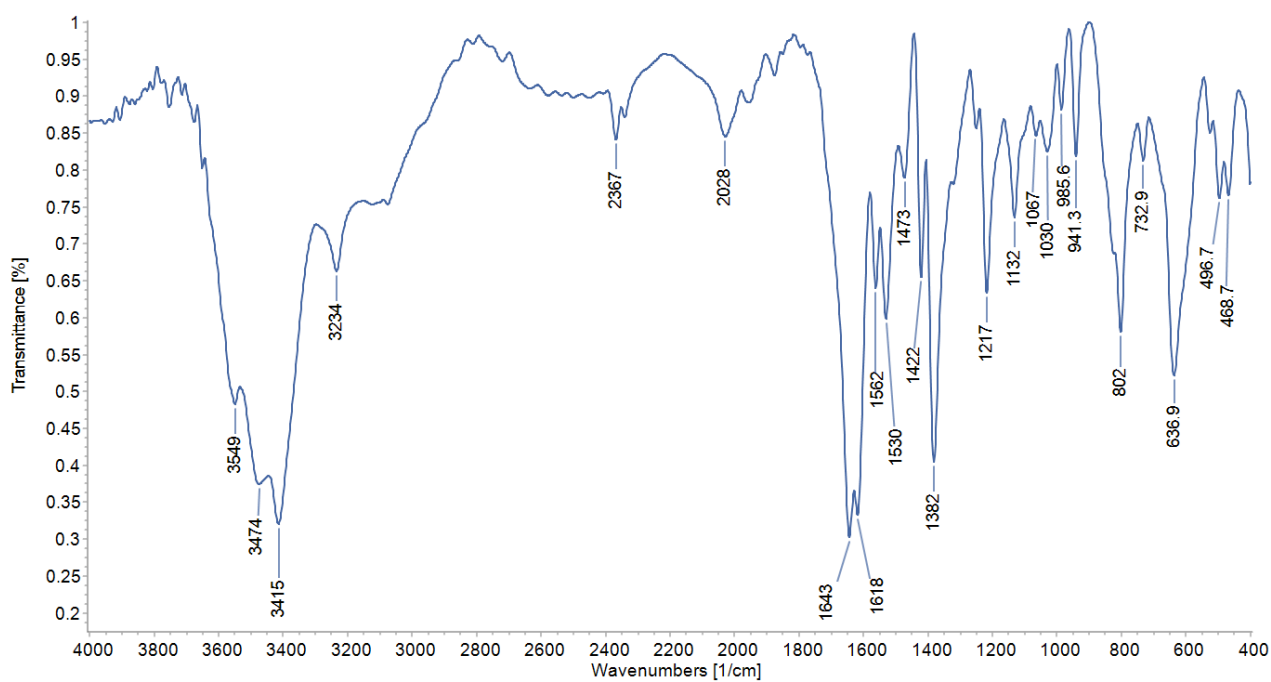
## 1. Crystal Structures

**Table S1.** Selected bond lengths (Å) and angles (°) for {[Co(4,4'-bpy)(H<sub>2</sub>O)<sub>4</sub>](6-Onic)<sub>2</sub>·2H<sub>2</sub>O}<sub>n</sub> (**1**) and {[Ni(4,4'-bpy)(H<sub>2</sub>O)<sub>4</sub>](6-Onic)<sub>2</sub>·2H<sub>2</sub>O}<sub>n</sub> (**2**).

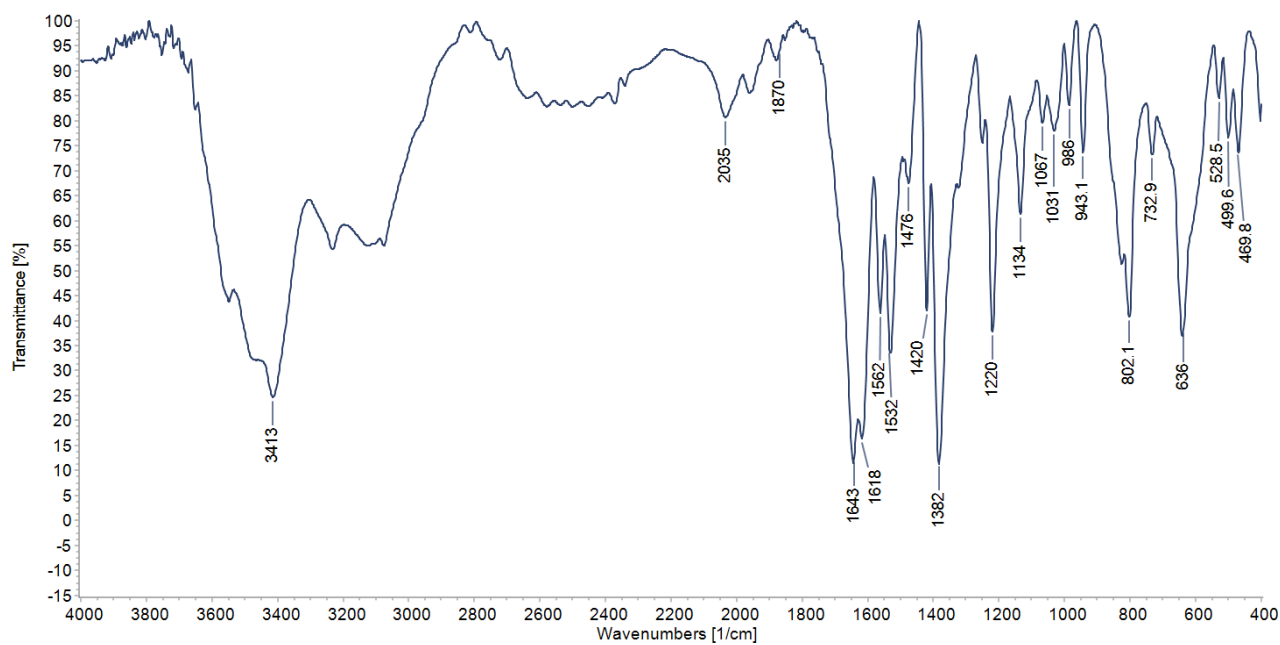
| 1                       |          | 2                       |          |
|-------------------------|----------|-------------------------|----------|
| Bond lengths            |          |                         |          |
| Co1–N1                  | 2.152(5) | Ni1–N1                  | 2.106(5) |
| Co1–N2                  | 2.153(5) | Ni1–N2                  | 2.099(5) |
| Co1–O1                  | 2.086(3) | Ni1–O1                  | 2.056(3) |
| Co1–O2                  | 2.080(3) | Ni1–O2                  | 2.060(3) |
| Bond angles             |          |                         |          |
| O2 <sup>i</sup> –Co1–O2 | 175.8(2) | O2 <sup>i</sup> –Ni1–O2 | 176.1(2) |
| O2 <sup>i</sup> –Co1–O1 | 92.2(1)  | O2 <sup>i</sup> –Ni1–O1 | 91.3(1)  |
| O2–Co1–O1               | 88.0(1)  | O2–Ni1–O1               | 88.9(1)  |
| O1 <sup>i</sup> –Co1–O1 | 175.1(2) | O1 <sup>i</sup> –Ni1–O1 | 174.6(2) |
| O2–Co1–N1               | 92.10(8) | O2–Ni1–N1               | 91.98(8) |
| O1–Co1–N1               | 87.55(8) | O1–Ni1–N1               | 87.29(9) |
| O2–Co1–N2               | 87.90(8) | O2–Ni1–N2               | 88.02(8) |
| O1–Co1–N2               | 92.45(8) | O1–Ni1–N2               | 92.71(9) |
| N1–Co1–N2               | 180      | N1–Ni1–N2               | 180      |

Symmetry code (i)  $-x+1, y, -z+3/2$ .

## 2. IR Spectra

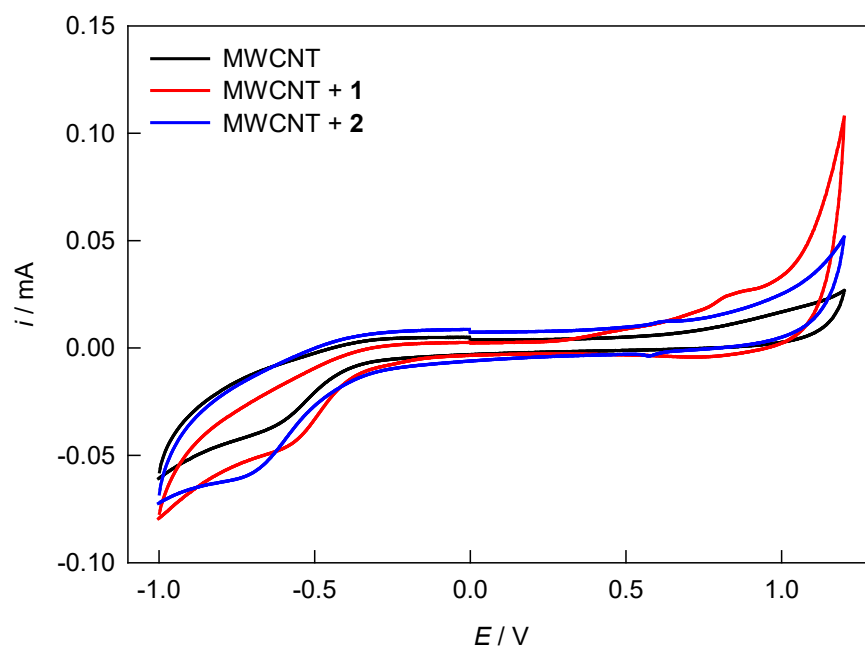


**Figure S1.** IR spectrum of  $[\text{Co}(4,4'\text{-bpy})(\text{H}_2\text{O})_4](6\text{-Onic})_2 \cdot 2\text{H}_2\text{O}$  (1).



**Figure S2.** IR spectrum of  $[\text{Ni}(4,4'\text{-bpy})(\text{H}_2\text{O})_4](6\text{-Onic})_2 \cdot 2\text{H}_2\text{O}$  (2).

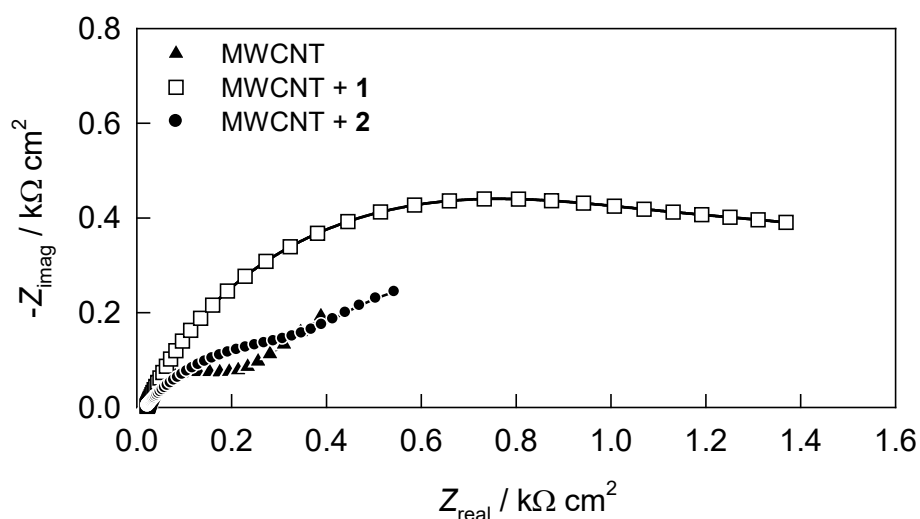
### 3. Cyclic Voltammograms



**Figure S3.** Cyclic voltammograms recorded in a broader range at MWCNT electrode, MWCNT|1 electrode and MWCNT|2 electrode in 0.1 mol L<sup>-1</sup> KNO<sub>3</sub> solution (pH 7.0).

### 4. Electrochemical Impedance Spectroscopy

The EIS data (Figure S4) have been fitted considering the Randles equivalent circuit. The higher charge transfer resistance ( $R_{ct}$ ) was obtained with the MWCNT|1 electrode ( $R_{ct} = 1449 \Omega \text{ cm}^2$ ), followed by the MWCNT|2 electrode ( $R_{ct} = 810 \Omega \text{ cm}^2$ ) and MWCNT electrode ( $R_{ct} = 400 \Omega \text{ cm}^2$ ). A significant increase of  $R_{ct}$  suggests highly non-conductor polymers 1 and 2 with higher passivating tendency. Therefore, polymers 1 and 2 deteriorate the electrochemical performances of MWCNT, and the combination of MWCNT|1 or 2 hinders the  $[\text{Fe}(\text{CN})_6]^{3-/4-}$  electron transfer and is characterized by a very strong passivating tendency of MWCNT electrode.



**Figure S4.** Electrochemical impedance spectra of the 1 mmol L<sup>-1</sup>  $[\text{Fe}(\text{CN})_6]^{3-/4-}$  redox probe in 0.1 mol L<sup>-1</sup> KNO<sub>3</sub> (pH 7.0) recorded at  $E_{\text{ocp}}$  for MWCNT electrode, MWCNT|1 electrode and MWCNT|2 electrode.

## 5. TGA/DTA Curves

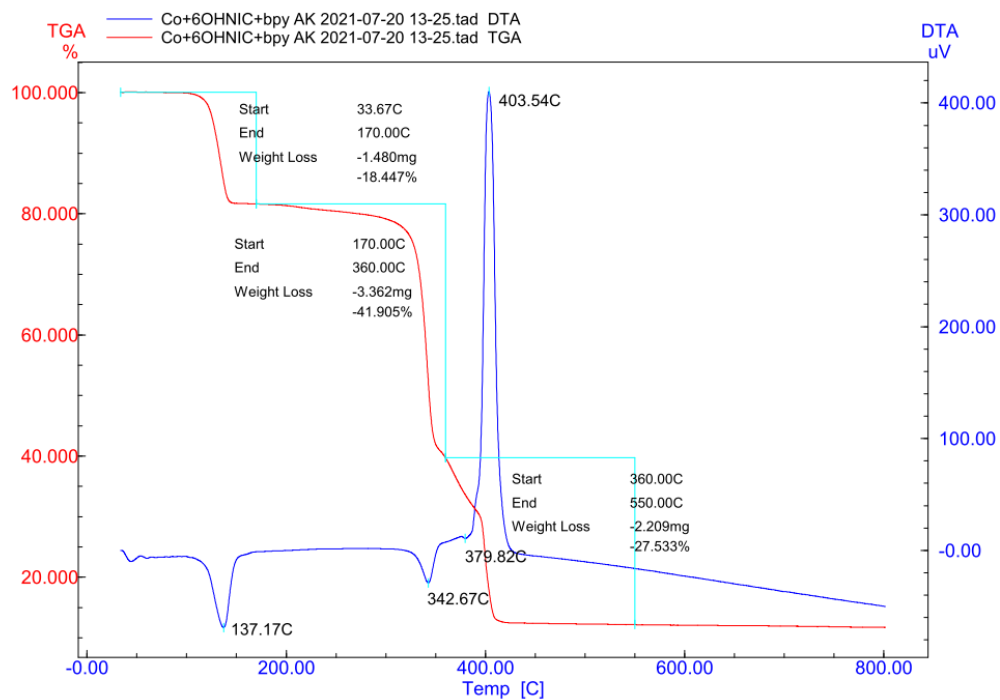


Figure S5. TGA/DTA curve of  $\{[\text{Co}(\text{4,4'-bpy})(\text{H}_2\text{O})_4](\text{6-Onic})_2 \cdot 2\text{H}_2\text{O}\}_n$  (1).

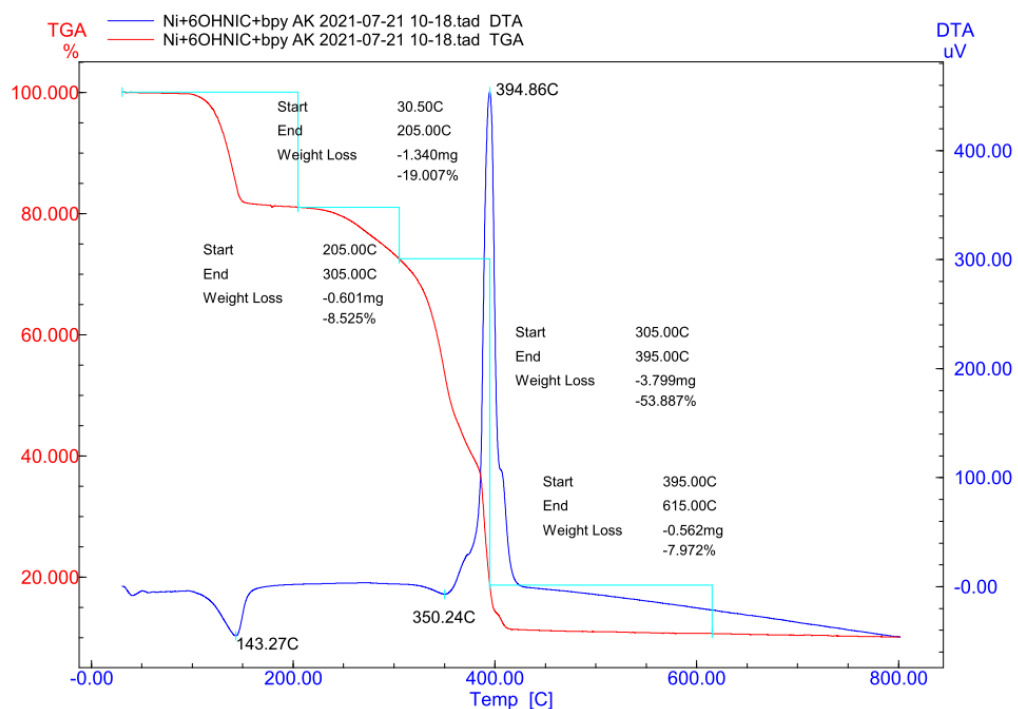


Figure S6. TGA/DTA curve of  $\{[\text{Ni}(\text{4,4'-bpy})(\text{H}_2\text{O})_4](\text{6-Onic})_2 \cdot 2\text{H}_2\text{O}\}_n$  (2).