**Supplementary Materials**

# Electrochemical Properties and Perspectives of Nickel(II) and Cobalt(II) Coordination Polymers—Aspects and an Application in Electrocatalytic Oxidation of Methanol

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1. EDS analysis

An energy-dispersive spectrum (EDS) was recorded for the Ni(II) (Figure S1) and Co(II) (Figure S2) polymers.

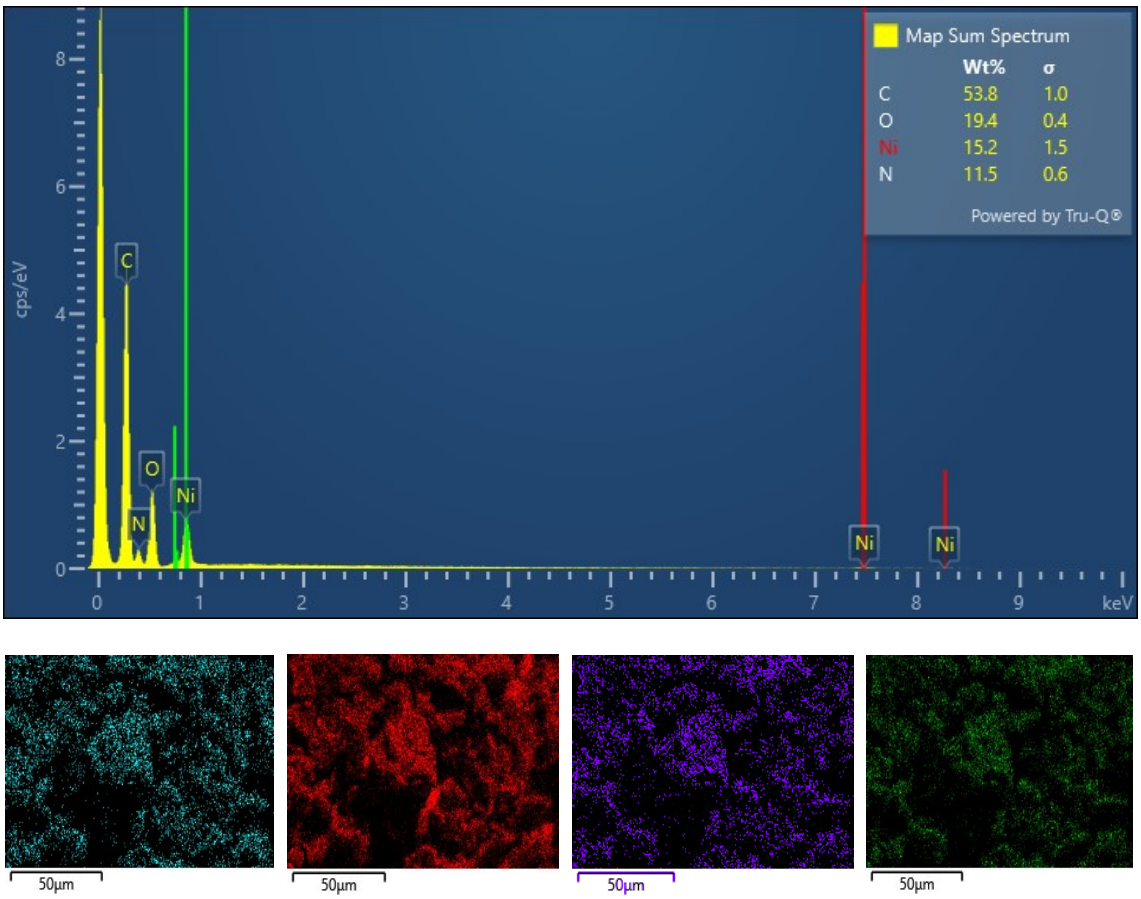


**Figure S1.** EDS analysis: Nickel - Carbon - Nitrogen - Oxygen.

**Table S1.** Table of elements ratio - theoretical vs EDS

| | **Theoretical mass ratio according to formula %** | **Ratio theoretical** | **EDS mass ratio** | **Ratio EDS** |
|---|---|---|---|---|
| **Ni** | 9.83% | 2.1 | 15.2 | 2.6 |
| **C** | 44.07% | 9.3 | 53.8 | 9.3 |
| **O** | 32.04% | ~7 | 19.4 | 3.3 |
| **N** | 9.33% | 2 | 11.5 | 2 |
| **H** | 4.71% | 1 | -- | |

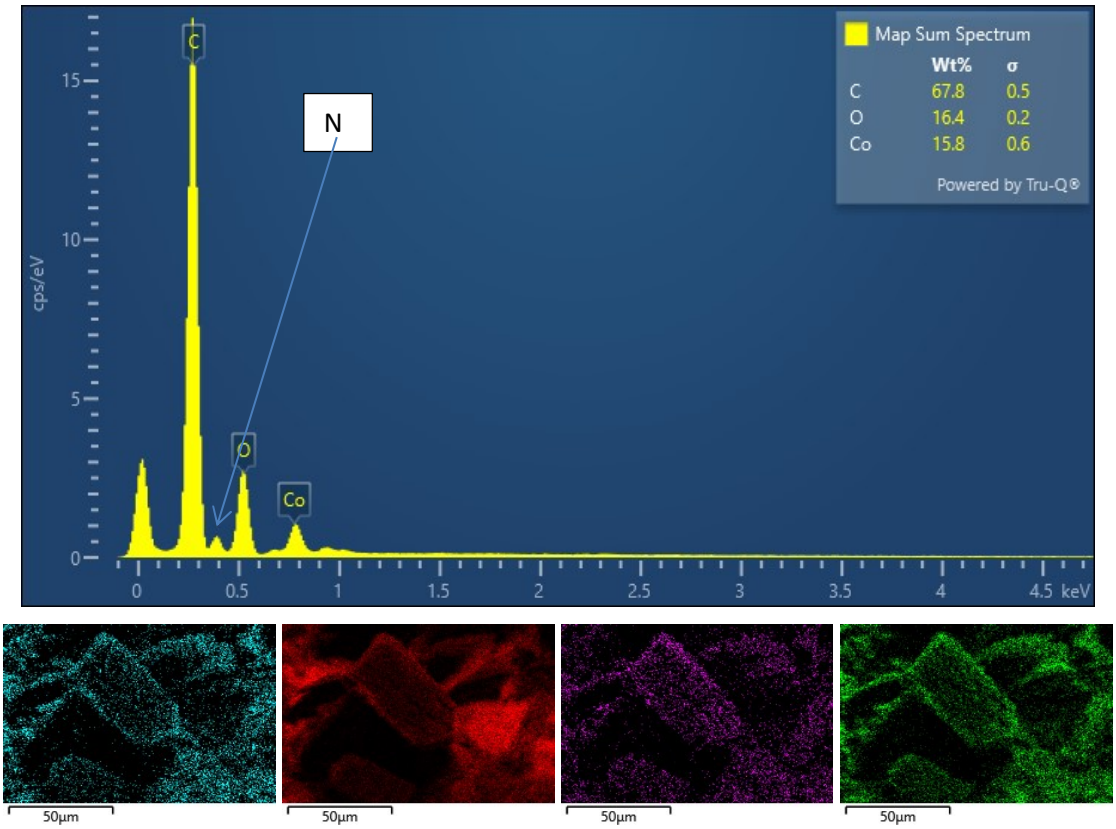


**Figure S2.** EDS analysis: Cobalt - Carbon - Nitrogen - Oxygen.

**Table S2.** Table of elements ratio - theoretical vs EDS

| | **Theoretical mass ratio according to formula %** | **Ratio theoretical** | **EDS mass ratio** | **Ratio EDS** |
|---|---|---|---|---|
| **Co** | 9.8 | 2.1 | 15.8 | 2.6 |
| **C** | 44.0 | 9.3 | 67.8 | 9.3 |
| **O** | 32.0 | ~7 | 16.4 | 3.3 |
| **N** | 9.3 | 2 | Assumption **1-5** | 2 |
| **H** | 4,71% | 1 | -- | |

## IR Spectra

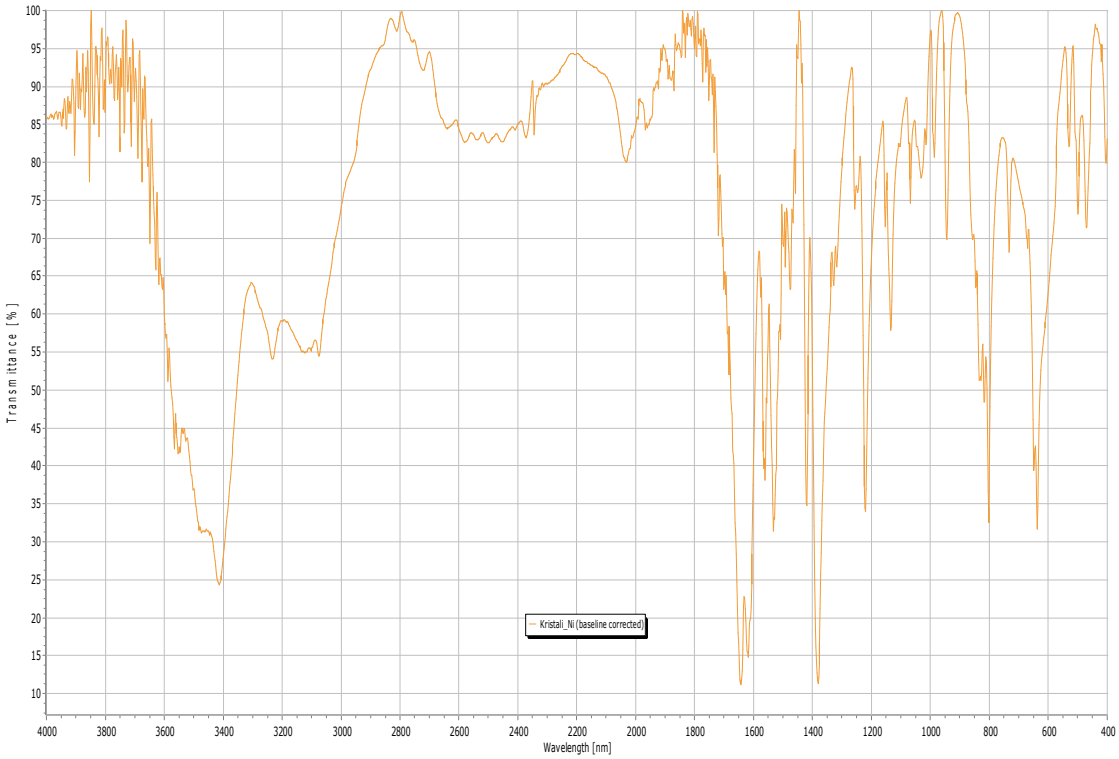


**Figure S3.** IR spectrum of $\{[Ni(4,4'\text{-bpy})(H_2O)_4](6\text{-Onic})_2{\cdot}2H_2O\}_n$

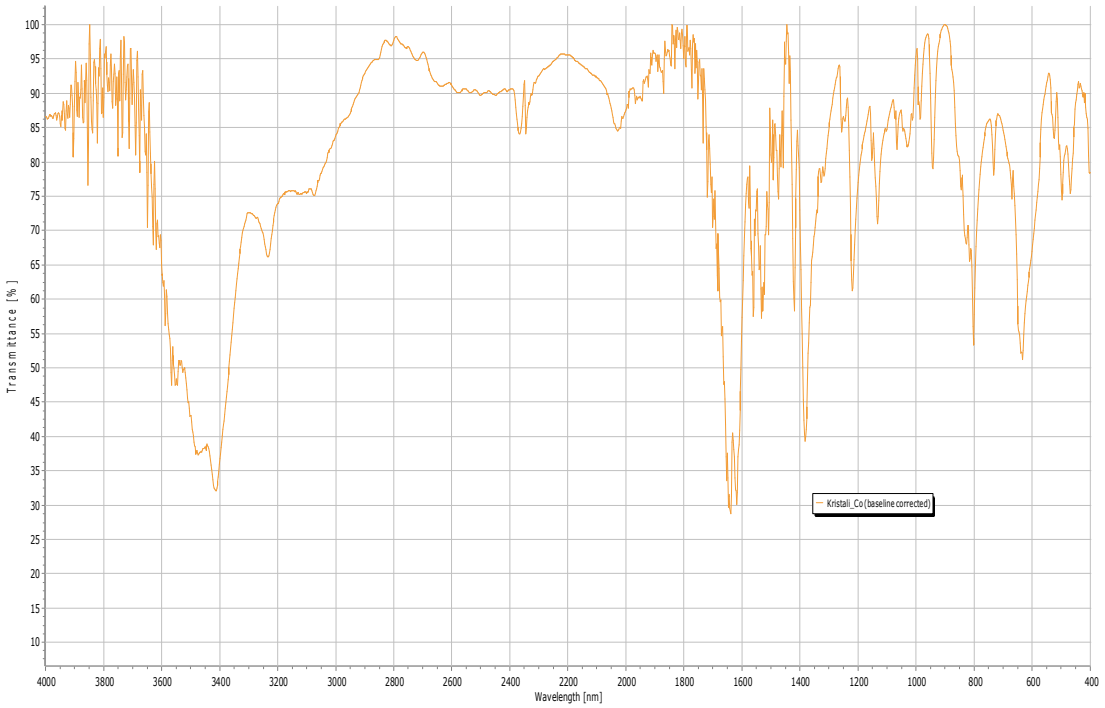


**Figure S4**. IR spectrum of $\{[Co(4,4'\text{-bpy})(H_2O)_4](6\text{-Onic})_2{\cdot}2H_2O\}_n$

**Table S3.** The selected vibration bands in the IR spectra of $\{[Ni(4,4'\text{-bpy})(H_2O)_4](6\text{-Onic})_2\cdot 2H_2O\}_n$ and $\{[Co(4,4'\text{-bpy})(H_2O)_4](6\text{-Onic})_2\cdot 2H_2O\}_n$

| Wavenumber, $cm^{-1}$ | | The assignation |
|---|---|---|
| Ni(II)-polymer | Co(II)-polymer | |
| 470 | 469 | symmetric out-of-plane C-H deformation |
| 636 | 631 | |
| 802 | 802 | |
| 944 | 942 | symmetrical deformation, C-O, C-N and in-plane stretching |
| 1220 | 1218 | C-OH stretching (Ph-OH) stretching |
| 1382 | 1382 | symmetrical C=O stretching from the COO- group 1562 (m), 1530 (m), 1473 (w), 1422 (m), 1382 (m), [νs($COO^-$)] |
| 1550 | 1550 | stretching of the C-C bond of the aromatic ring |
| 1643 | 1639 | stretching C=O stretching of the C=C and C=N bonds of the aromatic ring |
| 2033 | 2030 | asymmetric C=O stretching from the $COO^-$ group of a carboxylic acid |
| 3076 | 3074 | asymmetrical stretching C-H, C-N C-O bonds in aromatics |
| 3233<br>3414 (m)<br>3854 | 3233<br>3413 (m)<br>3854 | [$\nu$(O–H)] |