

Synthesis Modified Electrodes with Au/Pt Nanoparticles and Two New Coordination Polymers of Ag(I) and Cu(II) Constructed by Pyrazine and 3-Nitrophthalic Acid as a Novel Electrochemical Sensing Platform

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Abstract : Two new one and two dimensional metal organic coordination polymers of Cu(II), $[\text{Cu}(\text{3-nph})_2(\text{H}_2\text{O})_2\text{pz}]_n$ (1) and Ag(I), $\{[\text{Ag}(\text{3-nph})\text{pz}]\cdot\text{H}_2\text{O}\}_n$ (2) with pyrazine (pz) and 3- nitrophthalic acid (3-nph) have been synthesized and characterized by elemental analysis, spectral (IR, UV-Vis), thermal (TG/DTG) analysis and single crystal X-ray diffraction. We used these compounds to preparation modified electrode with Au/Pt nanoparticles in order to investigation electrochemistry and electrocatalysis activities. The surface structure and composition of the sensor were characterized by scanning electron microscopy (SEM). The Ag(I) coordination polymer shows a 2D layer structure constructed from dinuclear silver (I) building blocks in which two crystallographically Ag^+ ions are connected to each other by a covalent bond. The pyrazine ligands adopt μ_2 bridging modes, linking the metal centers into a one and two -dimensional coordination framework in 1 and 2. The two AgI cations are surrounded by pyrazine and 3-nitrophthalate mono anions and indicate distorted tetrahedral geometry. In the crystal structures of Ag(I) complex there are non-classical hydrogen bonding arrangements, $\text{C}-\text{O}\cdots\pi$ and $\pi-\pi$ stacking interactions. In Cu(II) coordination polymer, the coordination geometry around Cu(II) atom is a distorted octahedron. Interestingly, the structural analysis illustrates that the strong and weak hydrogen bond accompanied with $\text{C}-\text{H}\cdots\pi$ and $\text{C}-\text{O}\cdots\pi$ stacking interactions assemble the crystal structure of 1 and 2 into fascinating 3D supramolecular architecture.

Keywords : 3-nitrophthalic acid, crystal structure, coordination polymer, electrocatalysis

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