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Synthesis, characterization, crystal structure determination and luminescence study of new linear coordination polymers based on Mercury(II), Cadmium(II) and 4,7-phenanthroline ligand

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**Synthesis, Characterization, Crystal Structure Determination and Luminescence Study of  
New Linear Coordination Polymers Based on Mercury(II), Cadmium(II) and 4,7-  
Phenanthroline Ligand**

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**Abstract**

Three novel coordination polymers containing Hg(II) and /or Cd(II) with 4,7-phenanthroline ligand (4,7-phen) have been synthesized and structurally characterized by single-crystal X-ray diffraction. Complexes [Hg( $\eta^2$ -4,7-phen)Br<sub>2</sub>]<sub>n</sub> (**1**), [Hg( $\eta^2$ -4,7-phen)I<sub>2</sub>]<sub>n</sub> (**2**) and [Cd( $\eta^2$ -4,7-phen)I<sub>2</sub>]<sub>n</sub> (**3**) were prepared from the reaction of one equivalent of 4,7-phenanthroline ligand with one equivalent of HgBr<sub>2</sub> (**1**), HgI<sub>2</sub> (**2**) and CdI<sub>2</sub> (**3**), in methanol, respectively. Suitable crystals of title compounds were obtained for X-ray diffraction measurement by methanol diffusion into a DMSO solution. All compounds have linear polymeric structures which extend parallel to the *c* axis and contain Hg(II) and Cd(II) centers coordinated by two bridging 4,7-phenanthroline ligands, and two coordinated halogen molecules, completing the Hg(II) and Cd(II) coordination spheres, and resulting in a distorted tetrahedral geometry. Furthermore,  $\pi$ - $\pi$  (in **1-3**) and M-I $\cdots\pi$  (in **2** and **3**) interactions play crucial role on stabilization of the crystal packing. The luminescence properties of the free ligand as well as the complexes **1-3** were investigated in solution. Thermal stabilities of these complexes were also studied by TGA/DTA analyses.

Keyword: Hg(II), Cd(II), 4,7-Phenanthroline, Coordination Polymer, Crystal Structure, Luminescence, TGA/DTA analyses.

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