

论文

两个金属铜配位聚合物 $\text{Cu}_3(\mathbf{2,2'}\text{-bipy})_2(\text{C}_8\text{H}_4\text{O}_4)_2(\text{C}_8\text{H}_5\text{O}_4)_2$ 和 $\text{Cu}(\text{I})\text{Cu}(\text{II})(\mathbf{4,4'}\text{-bipy})_{1.5}(\text{C}_8\text{H}_4\text{O}_4)(\text{C}_8\text{H}_5\text{O}_4)$ 混合溶剂热合成及结构与性能研究

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摘要:

在中温混合溶剂热条件下合成了两个金属铜配位聚合物 $\text{Cu}_3(\mathbf{2,2'}\text{-bipy})_2(\text{C}_8\text{H}_4\text{O}_4)_2(\text{C}_8\text{H}_5\text{O}_4)_2$ 和 $\text{Cu}(\text{I})\text{Cu}(\text{II})(\mathbf{4,4'}\text{-bipy})_{1.5}(\text{C}_8\text{H}_4\text{O}_4)(\text{C}_8\text{H}_5\text{O}_4)$ (bipy=联吡啶, $\text{C}_8\text{H}_4\text{O}_4$ =1,3-间苯二甲酸), 并对其进行了单晶结构解析及相关性能表征. 配合物 $\text{Cu}_3(\mathbf{2,2'}\text{-bipy})_2(\text{C}_8\text{H}_4\text{O}_4)_2(\text{C}_8\text{H}_5\text{O}_4)_2$ (1)晶体属三斜晶系, $P1$ 空间群, $a=1.03314(4)$ nm, $b=1.08350(3)$ nm, $c=1.15826(4)$ nm, $\alpha=83.104(2)^\circ$, $\beta=84.609(2)^\circ$, $\gamma=66.125(2)^\circ$, $Z=1$. 配合物 $\text{Cu}(\text{I})\text{Cu}(\text{II})(\mathbf{4,4'}\text{-bipy})_{1.5}(\text{C}_8\text{H}_4\text{O}_4)(\text{C}_8\text{H}_5\text{O}_4)$ (2)晶体属三斜晶系, $P1$ 空间群, $a=1.06979(3)$ nm, $b=1.09209(3)$ nm, $c=1.47887(3)$ nm, $\alpha=91.795(2)^\circ$, $\beta=93.2460(10)^\circ$, $\gamma=118.6170(10)^\circ$, $Z=2$. 通过使用不同的有机碱配体(2,2'-联吡啶和4,4'-联吡啶), 并调节不同有机碱配体的用量, 得到了结构不同的两个目标晶体产物相. 产物均可稳定到300 °C.

关键词: 铜配位聚合物; 混合溶剂热反应; 晶体结构

Mixed Solvothermal Synthesis and Characterization of Two Copper Coordination Polymers: $\text{Cu}_3(\mathbf{2,2'}\text{-bipy})_2(\text{C}_8\text{H}_4\text{O}_4)_2(\text{C}_8\text{H}_5\text{O}_4)_2$ and $\text{Cu}(\text{I})\text{Cu}(\text{II})(\mathbf{4,4'}\text{-bipy})_{1.5}(\text{C}_8\text{H}_4\text{O}_4)(\text{C}_8\text{H}_5\text{O}_4)$

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Abstract:

Two copper coordination polymers, $\text{Cu}_3(\mathbf{2,2'}\text{-bipy})_2(\text{C}_8\text{H}_4\text{O}_4)_2(\text{C}_8\text{H}_5\text{O}_4)_2$ (1) and $\text{Cu}(\text{I})\text{Cu}(\text{II})(\mathbf{4,4'}\text{-bipy})_{1.5}(\text{C}_8\text{H}_4\text{O}_4)(\text{C}_8\text{H}_5\text{O}_4)$ were hydrothermally synthesized in mixed solvothermal and characterized by single crystal X-ray diffraction. $\text{Cu}_3(\mathbf{2,2'}\text{-bipy})_2(\text{C}_8\text{H}_4\text{O}_4)_2(\text{C}_8\text{H}_5\text{O}_4)_2$ (1) crystallizes in a triclinic system with space group $P1$ and cell parameters, $a=1.03314(4)$ nm, $b=1.08350(3)$ nm, $c=1.15826(4)$ nm, $\alpha=83.104(2)^\circ$, $\beta=84.609(2)^\circ$, $\gamma=66.125(2)^\circ$, and $Z=1$. $\text{Cu}(\text{I})\text{Cu}(\text{II})(\mathbf{4,4'}\text{-bipy})_{1.5}(\text{C}_8\text{H}_4\text{O}_4)(\text{C}_8\text{H}_5\text{O}_4)$ (2) crystallizes also in a triclinic system with space group $P1$ and cell parameters, $a=1.06979(3)$ nm, $b=1.09209(3)$ nm, $c=1.47887(3)$ nm, $\alpha=91.795(2)^\circ$, $\beta=93.2460(10)^\circ$, $\gamma=118.6170(10)^\circ$, and $Z=2$. Their syntheses were performed under the similar conditions from different organic alkali ligands 2,2'-bipy and 4,4'-bipy at different concentrations. These changes gave rise to the corresponding change in final crystal structure of products. Both compounds are thermally stable up to 300 °C.

Keywords: Copper coordination polymer; Mixed solvothermal reaction; Crystal structure

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