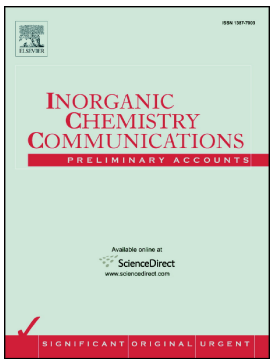

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Short Communication

Synthesis, Structure and Luminescent of Ag Based Homochiral Metal Tetrazolate Coordination Polymers

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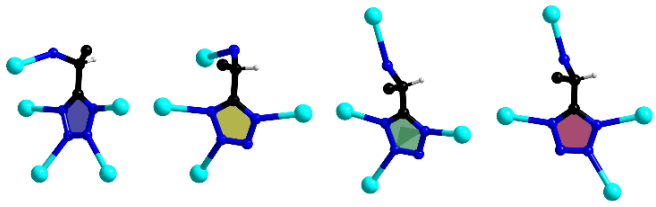
Abstract

The assemble of chiral tetrazolate derivative (1S)-1-(5-tetrazolyl)ethylamine (5-eatzH) ligand with AgCl and $AgNO_3$ results into two metal tetrazolate coordination polymers. Rich coordination modes of 5-eatzH and two rare secondary building units (SBUs), the Ag_2Cl (**1**) and Ag_3(5-eatz)$_4$ (**2**), were observed in these compounds, which show with (3,7)-connected and (4,6)-connected topological nets, respectively. A comparison of two compounds suggests that anions in the reaction system play an important role in the formation of the SBUs and final frameworks. Our results prove that the 5-eatzH is an excellent candidate to construct diverse and interesting chiral coordination polymers. The solid state luminescent properties of compounds **1** and **2** at ambient temperature were also investigated.

Keywords: chiral coordination polymers; tetrazole; single crystal; topology; luminescent properties.

Homochiral metal organic frameworks (HMOFs) [1] have received extensive attention for their potential applications in asymmetry catalysis and enantioselective separation [1-3]. Although great progress has been made in recent years, the design and synthesis of HMOFs are still a huge challenge for chemists. Until now, several synthetic methods such as spontaneous resolution [4], chiral induction [5] and use of enantiopure ligands [6], have been used to construct HMOFs with homochirality. Among these methods, the most effective way to synthesize HMOFs is still to select an enantiopure ligand to impart homochirality to the corresponding frameworks.

Natural amino acids and their derivatives are universally considered to be simple and ideal precursors for constructing HMOFs due to their coordination variety and chirality [7-10]. Among them, the kind of organic compounds combining tetrazole groups and chiral amino groups can be elected as good candidates to construct diverse HMOFs. In our former works, the chiral tetrazolate derivative, (1S)-1-(5-tetrazolyl) ethylamine (5-eatzH) was used to assemble with Cu salts and several HMOFs were successfully synthesized, which exhibit interesting structure features and potential enantioselective applications [10].



Scheme 1. Coordination modes of 5-eatz ligand involved in **1** and **2**.

As the continuous work, by choosing 5-eatzH ligand to assembly with Ag^+ salts, we successfully prepared another two homochiral metal tetrazolate frameworks (HMTFs): {Ag_2Cl(5-eatz)}$_n$ (**1**) and {Ag_6(5-eatz)$_6$·H_2O}$_n$ (**2**). Interestingly, some rare secondary building units, for example, the 1D $(Ag_2Cl)_n$ chain and Ag_3(5-eatz)$_4$ SBU were captured in these compounds. In addition, the 5-eatz ligand exhibits various coordination modes due to the presence of the multiple N atoms (scheme 1), which demonstrates that the 5-eatz ligand is an excellent candidate to construct diverse and interesting HMOFs.

Compound **1** can be conveniently synthesized via slow evaporation at room temperature. The AgCl in $NH_3.H_2O$ aqueous solution was added in the solution of 5-eatzH in MeOH. The mixture was then stirred for 10 minutes and placed at room temperature for one week, and the colourless crystals were obtained. Compound **2** was obtained in the same condition with compound **1**, except that AgCl was replaced by $AgNO_3$.

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