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研究论文

# 含有十二元环交叉孔道的新颖亚磷酸铟[$In_4(HPO_3)_7(H_2O)_3$]($NH_3CH_2CH_2NH_3$)·($H_2O$)的水热合成与表征

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摘要 在含有HF的体系中, 用乙二胺作模板剂, 通过水热方法合成了一个新的三维亚磷酸铟[$In_4(HPO_3)_7(H_2O)_3$]($NH_3CH_2CH_2NH_3$)·($H_2O$), 并对其进行了红外光谱、热重、ICP和CHN元素分析等表征. 单晶X射线衍射分析结果表明, 该化合物属于三方晶系, *P*3空间群, 晶胞参数$a$=1.37883(7) nm, $c$=0.93450(9) nm, $V$=1.53862(2) $nm^3$, Z=2, $D_c$=2.489 $Mg/m^3$, 最终一致性因子$R_1[I>2\sigma(I)]$=0.0526, $wR_2[I>2\sigma(I)]$=0.1328, GOF=1.082. 其结构中的$InO_6$八面体、$InO_5(H_2O)$八面体和$HPO_3$假四面体通过O原子共顶点连接, 分别沿$a$, $b$轴方向形成含有十二元环的交叉孔道, 客体水分子和双质子化的乙二胺分子存在于孔道中.

关键词 水热合成 晶体结构 乙二胺 亚磷酸铟

分类号 O614.37

# Hydrothermal Synthesis and Characterization of a New Indium Phosphite [$In_4(HPO_3)_7(H_2O)_3$]($NH_3CH_2CH_2NH_3$)·($H_2O$) with Intersecting Twelve-membered Ring Channels

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**Abstract** A new three-dimensional indium phosphite, [$In_4(HPO_3)_7(H_2O)_3$]($NH_3CH_2CH_2NH_3$)·($H_2O$), was synthesized under hydrothermal conditions in the system containing HF using ethylenediamine as the template and characterized by IR spectroscopy, TG, ICP and C, H, N elemental analysis. The result of single-crystal X-ray diffraction analysis reveals that the title compound crystallized in trigonal system, space group *P*3 with unit cell parameters $a$=1.37883(7) nm, $c$=0.93450(9) nm, $V$=1.53862(2) $nm^3$, $Z$=2, $D_c$=2.489 $Mg/m^3$, $R_1[I>2\sigma(I)]$=0.0526, $wR_2[I>2\sigma(I)]$=0.1328, GOF=1.082. Its structure is built up from shared vertex linking $InO_6$, $InO_5(H_2O)$ octahedral and $HPO_3$ pseudo-pyramidal units by O atoms, forming intersecting twelve-membered ring channels along $a$ and $b$ axes directions. Guest water and diprontonated ethylenediamine molecules exist in the channels.

**Key words** Hydrothermal synthesis Crystal structure Ethylenediamine Indium phosphite

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