

研究论文

多金属氧酸盐/介孔分子筛杂化材料的合成——无机前驱的配比和老化温度的影响

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**摘要** 用嵌段共聚物P123为模板剂, 正硅酸乙酯(TEOS)和缺位结构的多金属氧酸盐 $\text{SiW}_{11}$ 为无机前驱体, 由溶胶-凝胶法合成了具有六方结构和 $\text{SiW}_{11}$ 共价键联的介孔分子筛杂化材料 $\text{SiW}_{11}/\text{SBA-15}$ ,

着重考察了无机前驱的配比和老化温度对杂化材料结构及 $\text{SiW}_{11}$ 负载量的影响. 研究表明, 随 $\text{SiW}_{11}$ 用量的增大, 其负载量增高, 但很快趋于饱和; 且用量越大对模板组装的干扰也越大, 导致孔结构的有序性下降. 高温老化有利于介孔结构的形成和孔阵列有序性的增加, 但导致已反应的 $\text{SiW}_{11}$ 水解脱落, 不利于其键联.

**关键词** [多金属氧酸盐](#) [介孔分子筛](#) [杂化材料](#) [原料配比](#) [老化温度](#)

分类号

## Synthesis of Hybrid Polyoxometalate/Mesoporous Molecular Sieve Materials—The Influences of Ratio of Inorganic Precursors and Aging Temperature

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**Abstract** Hybrid mesoporous molecular sieve materials with hexagonal mesoporous structure and covalent bonded polyoxometalates were synthesized based on tetraethoxysilane (TEOS) and lacunary polyoxometalate,  $\text{SiW}_{11}$ , via sol-gel method in the presence of triblock copolymers P123 as the structure-directing agent. The influences of molar ratio of inorganic precursors and aging temperature on the structure and the loadings of  $\text{SiW}_{11}$  in the hybrid materials were investigated. Some reaction details in the synthesis were revealed. It was found that the loadings of  $\text{SiW}_{11}$  in the hybrid materials increases with the increase of the ratio of  $\text{SiW}_{11}$  but goes saturated soon. The long-rang order of mesophase declines with increasing  $\text{SiW}_{11}$  dosage since the assembly of template is perturbed by the polyoxometalate. It was also observed that higher aging temperature is favorable to the formation of mesophase and the increase of long-rang order, but results in the hydrolysis and removal of bonded  $\text{SiW}_{11}$ .

**Key words** [polyoxometalate](#) [mesoporous molecular sieve](#) [hybrid material](#) [molar ratio of inorganic precursor](#) [aging temperature](#)

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