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研究简报

层状和MSU结构的介孔纳米二氧化锆

刘欣梅*,[1]，阎子峰[1]，逯高清[2]

([1]中国石油大学重质油国家重点实验室 东营 257061)

([2]ARC Centre for Functional Nanomaterials, University of Queensland, QLD 4072, Australia)

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摘要 在不添加任何结构稳定剂的条件下,
首次用固态反应结构导向法成功地合成了具有层状结构和MSU结构的介孔纳米二氧化锆. 研究发现,
通过有效地控制晶化条件, 二氧化锆的晶相、比表面和孔结构可以方便地得以调变. 晶相的转变由粒度大小控制,
并且构成无机骨架的相态不同, 合成样品的热稳定性存在差异. 结果显示,
介孔纳米二氧化锆的形成仍遵循超分子液晶模板机制, 且由碱锆摩尔比的大小控制介观相的转化,
低碱锆摩尔比条件下形成层状相, 而高碱锆摩尔比条件下为维持整个体系的低能稳定状态,
在电荷作用下形成反棒状胶束结构.

关键词 固态反应 介孔 纳米 二氧化锆 层状结构 MSU结构 形成机制

分类号

Mesoporous Nanocrystalline Zirconia with Lamellar and MSU Structure

LIU Xin-Mei*,[1], YAN Zi-Feng[1], LU Gao-Qing[2]

([1] *State Key Laboratory for Heavy Oil Processing, China University of Petroleum, Dongying 257061*)

([2] *ARC Centre for Functional Nanomaterials, University of Queensland, QLD 4072, Australia*)

Abstract Without introduction of any stabilizer, the mesoporous nanocrystalline zirconia with lamellar and MSU structure was obtained via solid state reaction coupled with surfactant templating method. The phase, surface area and pore structure of zirconia prepared with this novel method could be designed, tailored and controlled by varying synthesis parameters. The phase transformation was controlled by particle size. The mesostructure possesses nanocrystalline pore wall, which renders it more thermally stable than amorphous framework. The results suggest strongly that in solid state synthesis system mesostructure formation still follow the supramolecular self-assembly mechanism. The lamellar and reverse hexagonal structure could be transformed at different OH^-/Zr molar ratios in order to sustain the low surface energy of the mesophases. The lamellar structure was preferred at higher OH^-/Zr molar ratios but reverse hexagonal was at low ratios.

Key words solid state reaction mesopore nanocrystalline zirconia lamellar structure MSU structure mechanism

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通讯作者 刘欣梅 lxmei@mail.hdpu.edu.cn