

论文

AMS-8-NH₂的合成及其对ODN的负载释放

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摘要:

以阴离子表面活性剂肉豆蔻酰基谷氨酸钠(C₁₄GluA-Na)为模板剂, 3-氨基丙基三甲氧基硅烷(APS)为辅助结构导向剂, 合成了介孔材料AMS-8-NH₂, 并结合XRD分析、N₂吸附/脱附技术及²⁹Si魔角旋转核磁共振(MAS NMR)等技术手段对纳米孔洞材料AMS-8-NH₂进行了表征. 结果表明, AMS-8-NH₂是高度有序的纳米孔洞材料, 其孔径和比表面积分别为3.2 nm和706 m²/g; 有机胺基团通过化学键连接在材料内表面, 这些基团的覆盖度达到25%. 以AMS-8-NH₂为载体, 寡核苷酸(ODN)为模型生物分子研究在不同条件下AMS-8-NH₂对ODN的吸附和释放性能, 实验结果表明, 当ODN浓度一定时, 溶液的pH值越低, 对ODN的吸附量越大, pH=4.7时对ODN的最大负载量可达214 mg/g; 在释放过程中, 材料对ODN具有较高的缓释能力, 随环境pH值增加, 释放量增加.

关键词: 介孔材料AMS-8-NH₂; 寡核苷酸; 吸附; 释放

Synthesis of AMS-8-NH₂ and Its Loading-release of Oligodeoxynucleotide

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Abstract:

Mesoporous silicas of AMS-8-NH₂ have been synthesized with the anionic surfactant *N*-myristoyl-*L*-glutamic acid sodium(C₁₄GluA-Na) and 3-amino propyltrimethoxy silane(APS) as co-structure-directing agents(CSDA). The materials were characterized by powder X-ray diffraction(XRD), N₂ adsorption/desorption analysis and ²⁹Si magic angle spinning nuclear magnetic resonance(MAS NMR). The results exhibit that the structure of AMS-8-NH₂ has a long range order of three-dimensional cage-like connecting aperture with about 3.2 nm pore diameter and 706 m²/g special surface area respectively nano-hole material. Organic amine groups have anchored chemically to the surface of material through chemical bonding, whose coverage has reached 25%. The resulting AMS-8-NH₂ materials were used as vehicles and herring sperm oligodeoxynucleotide(ODN) as a model biological molecule for discussing the loading and release character of ODN on AMS-8-NH₂. The loading experiment shows that when the solution concentration is fixed, the higher solution acidity, the higher loading capability and the maximum amount can reach 214 mg/g at pH=4.7. Among the release process, high sustained release effect of ODN on materials is displayed, which is controlled by environmental pH value. The greater the pH value, the higher the release amount.

Keywords: Mesoporous silicas of AMS-8-NH₂; Oligodeoxynucleotide(ODN); Adsorption; Release

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