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仿细胞外层膜结构修饰交联壳聚糖的研究

宫铭[1], 石玉静[1], 吴伯华[1], 熊善新[1], 宫永宽[2]

1. 西安科技大学化学与化工学院 西安 710054;
2. 西北大学 合成与天然功能分子化学教育部重点实验室 化学与材料科学学院 西安 710069

FABRICATION AND ANTICOAGULATION PROPERTIES OF CELL OUTER MEMBRANES MIMETIC ON GLUTARALDEHYDE-CROSSLINKED CHITOSAN

Ming Gong[1], Yu-jing Shi[1], Bo-hua Wu[1], Shan-xin Xiong[1], Yong-kuan Gong[2]

1. School of Chemistry and Chemical Engineering, Xian University of Science and Technology, Xian 710054;
2. Key Laboratory of Synthetic and Natural Functional Molecule Chemistry of Ministry of Education, College of Chemistry & Materials Science, Northwest University, Xian 710069

全文: PDF (1090 KB) HTML (1 KB) 输出: BibTeX | EndNote (RIS) 背景资料

摘要 采用溶液自由基聚合,合成甲基丙烯酰氧乙基磷酰胆碱(MPC)-甲基丙烯酰氧丙基三甲氧基硅(TSMA)二元共聚物(PMT82),将其涂覆在戊二醛交联壳聚糖(CS-GA)表面,通过三乙胺蒸汽催化处理获得具有仿细胞外层膜结构(CS-GA-PMT82b)的表面.用动态接触角(DCA)、X-射线光电子能谱(XPS)对改性后交联壳聚糖表面的亲疏水性、元素组成等进行表征,并通过血小板黏附实验对其抗凝血性进行评价.研究结果表明,这种利用涂覆催化交联的方式将含有三甲氧基硅可交联基团的磷酰胆碱聚合物交联固定在壳聚糖表面,获得了较为稳定的仿细胞外层膜结构的CS-GA-PMT82b涂层表面.与壳聚糖相比,改性后壳聚糖的血小板黏附显著减少,抗凝血性能显著提高.这种改善材料的方式有望成为生物医用材料表面改性领域的有效的新手段.

关键词： 壳聚糖 仿细胞外层膜结构 磷酰胆碱 抗凝血性

Abstract： The copolymer PMT82 was synthesized by free radical polymerization of 2-methacryloyloxyethyl phosphorylcholine (MPC) and trimethoxysilylpropyl methacrylate (TSMA) with the monomer ratio of 8∶2.The copolymer PMT82 was dip-coated onto glutaraldehyde-crosslinked chitosan (CS-GA) surfaces to prepare phosphorylcholine-coated CS-GA film (CS-GA-PMT82a) and then stabilized by the amine-catalyzed crosslinking reactions of the trimethoxysilane groups,obtaining the phosphorylcholine-crosslinked CS-GA surfaces (CS-GA-PMT82b).The hydrophilicity and elementary composition of the modified surfaces of were characterized by dynamic contact angle (DCA) measurements and X-ray photoelectron spectroscopy (XPS).The obvious decrease in the contact angles and the new signals for P_{2p},Si_{2p} and $-N^+(CH_3)_3$ provided strong evidences for the successful establishment of PMT82 on the CS-GA surface.The anticoagulation property of the surfaces was estimated by platelet adhesion measurements.Compared with the chitosan films,the CS-GA-PMT82b surfaces massively reduced the platelet adhesion,indicating that the cell outer membrane mimetic structures were formed on the modified surfaces with PMT82 as the coat,which led to the significantly improved anticoagulation property of the modified surfaces of the composite material.This facile method of fabricating the stable cell outer membrane mimetic surfaces by dip-coating and catalytic crosslinking may have potential applications in the fields of anticoagulation property coatings,drug delivery,and tissue engineering.

Key words： Chitosan Cell outer membrane mimetic structures Phosphorylcholine Anticoagulation

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