

## 研究论文

### 多级开孔壳聚糖海绵的细胞行为分析

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**摘要:** 使用冰滴为致孔剂制备表面大孔、内部孔洞相连的新型壳聚糖(HPCS)支架, 将其与聚乳酸复合制备出三维蜂窝状孔洞结构的复合支架(THCP)。对HPCS和THCP进行了表面形貌、力学性能、细胞相容性等方面的表征, 并与常规冻干法所制备的壳聚糖(CS)海绵进行了对比。结果表明, 在HPCS海绵表面均匀分布着大而开放的孔洞, 大孔内部形成相互贯通的小孔, 在THCP复合海绵内部形成了相互贯通的蜂窝状结构。THCP支架的力学强度比纯壳聚糖支架有明显的提高, 其细胞活性及细胞增殖指数等都明显优于HPCS及CS海绵。因此, 对壳聚糖拓扑结构的这种设计不仅弥补了常规冻干支架的缺陷, 提高了细胞相容性, 还将表面图案化改性应用延伸到了三维尺度。

**关键词:** 有机高分子材料 壳聚糖 多级开孔支架 蜂窝状结构 细胞相容性

### Analysis of Cell Behaviors in Chitosan Sponges with Hierarchical Open Pores

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**Abstract:** A novel hierarchically porous chitosan (HPCS) sponge with large open pores and interconnected small pores on the surface was fabricated with ice particles as porogen. The honeycomb patterned porous composite scaffolds (HPCS) was obtained by immersing the sponges into poly (L-lactic acid) chloroform solution. A comparison of the morphology, mechanical properties and cell compatibility with the three different sponges were made. Results show that honeycomb patterned porous structure is visible in the THCP sponges, wherein interconnected micro pores embedded in larger open pores and formed uniform network. Hierarchically porous structure is visible in the HPCS sponges. The compressive strength of the THCP sponges dramatically increased, cell viability and cell proliferation index (PI) are higher than that of the CS and HPCS sponges. The topographical design of chitosan scaffolds remedied the traditional freeze-drying technique, improved cell biocompatibility and elongated the design of topological structure into the three dimension area.

**Keywords:** organic polymer materials chitosan hierarchically porous scaffold honeycomb patterned structure cell compatibility

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