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添加载银纳米TiO_2对硅橡胶抗菌性能及生物相容性的影响

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摘 要：研究添加载银纳米TiO_2对硅橡胶的抗菌性能及生物相容性的影响。将载银纳米TiO_2粉末按不同质量分数0~2.5%添加至硅橡胶，在140 ℃高温硫化1.5 h制成样品；采用浸渍培养法检测样品的抗菌性能；采用MTT法检测样品的细胞毒性，并采用体外细胞培养实验检测样品对细胞黏附的影响，实验细胞为小鼠成纤维细胞(Rat fibroblast cells, L929)。研究结果表明，在TiO_2粉末含量为0~2.0%时，硅橡胶的抗菌率随添加载银纳米TiO_2含量的增加而增加；当添加量为2.0%和2.5%时，其抗菌率均达100%；当TiO_2含量为0与2.0%时，浸提液对L929无细胞毒性；与L929接触培养48 h后，在TiO_2含量为2.0%的样品表面，细胞呈长梭形，伸展良好，而不添加TiO_2的样品表面，细胞伸展欠佳，多数细胞蜷缩变形成枣核状；添加载银纳米TiO_2后硅橡胶具有抗菌性、无细胞毒性并有利于细胞的黏附。

关键字：纳米；二氧化钛；硅橡胶；生物相容性

Effect of addition of Ag-embedded nano-TiO_2 on antibacterial activity and biocompatibility of silicone rubber

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Abstract: The effects of addition of Ag-embedded nano-TiO_2 on antibacterial activity and biocompatibility of silicone rubber in vitro were investigated. Ag-embedded nano-TiO_2 was added to medical silicone rubber materials ranging from 0 to 2.5%, and the samples were vulcanized at 140 ℃ for 1.5 h. In vitro bacteria culture, the antibacterial effect of samples was tested. MTT assay method was used to evaluate the cytotoxicity of sample to the rat fibroblast cells L929. Cell culture method was used to assess the influence of sample on adhesion of L929. With the increase of Ag-embedded nano-TiO_2 content, the inhibition rates of the samples increase. The inhibition rates of samples with the addition of 2.0% and 2.5% TiO_2 are both 100%. The leaching liquors without TiO_2 and with the addition of 2.0% TiO_2 are nontoxic to L929. After cultured for 48 h, L929 cells are flat and extended to long spindle shapes on the surface of samples added 2.0% TiO_2, while most L929 cells on the surface of samples without TiO_2 are rolled up. Silicone rubber with Ag-embedded nano-TiO_2 has outstanding antibacterial property. Cell adhesion of silicone rubber can be improved by adding Ag-embedded nano-TiO_2.

Key words:nanometer; titanium dioxide; silicone rubber; biocompatibility