

The use of functionalized titanate nanotubes as drug delivery systems

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The aim of this work was to tailor the hydrophobicity of TNTs by functionalizing them in order to enhance permeability, decrease toxicity and therefore to increase their bioavailability [1].

Trichlorooctylsilane (TCOS), trichlorooctadecylsilane (TCOdS) and Mg stearate (MgSt) were utilized to functionalize TNTs. The effectiveness of functionalization was investigated by using a vario EL cube elemental analyzer (Elementar, Langenselbold, Germany) and an optical contact angle tester (OCA20, Dataphysics, Germany) to determine the H, C, N, and S contents and surface free energy of the samples, respectively. Moreover, cytotoxicity line of the samples was tested on Caco-2 cell line by using MTT assay, while the results of permeability experiments were tested by an X-ray fluorescent analyzer (Philips MiniPal PW 4025, Philips Analytical, the Netherlands). The results showed that all tested reagents are suitable for tailoring the surface characteristics of TNTs, but the length of the side chain has no significant effect on TNTs' polarity, especially when using TCOS and TCOdS. However, functionalizing TNTs with MgSt was cheaper, faster, less toxic and easier to be upscaled comparing to silane materials.

References

1. Ranjous, Y. et al. Nanomaterials. Standpoint on the priority of TNTs and CNTs as targeted drug delivery systems. 24(9), 1704-1709 (2019).

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