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Biocompatibility of TiO₂, TiN and TiNO Thin Films Deposited by DC Reactive Magnetron Sputtering

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Titanium dioxide (TiO₂), Titanium nitride (TiN) and Titanium oxynitride (TiNO) are considered as promising material for the medical biology applications. In this study, The properties of biocompatibility on TiO₂, TiN and TiNO thin film deposited by dc reactive magnetron sputtering on glass substrate were investigated. The material characterized techniques such as x-ray diffraction (XRD), atomic-force microscopy (AFM), contact angle measurement were used to analyze crystal structure, surface morphology and wettability, respectively. The standard toxicity test method (Assay based on cell cultures) was employed on the various films and observed the number of cell on the film surface by scanning electron microscopy (SEM). It's was found from the XRD spectra that TiO₂ thin film shows the amorphous structure, whereas the TiN and TiNO thin films exhibit the polycrystalline structure. The surface roughness (Ra) of the films obtained by AFM is in the range of 1.77 - 4.17 nm that Ra increase from TiNO, TiO₂ to TiN thin film. The contact angle of the films is between 20.37 - 61.60° and decreases from TiO₂, TiNO to TiN. The various films are non-toxicity on the tissue cells. But TiNO spread cell is mainly shows on TiNO indicating the ratio of reactive gas affects the biological response of cells.

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