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Random access preamble design based on time pre-compensation for LTE-satellite system

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Because of the integration of long term evolution (LTE) technology and mobile satellite communication systems, uplink access technology for LTE-based GEO satellite has become a popular research topic for satellite system. In order to solve the problem of unreasonable design for PRACH signal structure and reduce the effect of time uncertainty, this paper proposes a novel random access preamble based on time pre-compensation (TPC) for LTE-Satellite System. In this scheme, by applying the method of non-linear least squares, the user terminal (UT) can use the receiving power to estimate the communication round trip delay (RTD) and based on the transmission delay of the beam center and the satellite, RTD can be compensated before transmission. Therefore, the preamble length and duration can be reduced without related to the maximum of RTD. In order to verify the performance of the scheme, the Mat lab is used to build a test system. The simulation results show that the proposed preamble satisfies the requirements of LTE-Satellite System, and the better performance than previous researches is obtained.

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The effect of electro pulsing induced gradient topographic oxide coating of Ti-Al-V alloy strips on the fibroblast adhesion and growth

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The effects of electro pulsing induced gradient topographic oxide coating of Ti-Al-V alloy matrix strips on the fibroblast adhesion and growth were investigated. The goal in biomaterial surface modification was to possess desired recognition and specificity through modifying its surface condition like topological structure. Here we developed a unique strategy of high-energy electro pulsing treatment (EPT) for manipulating surface gradient bio-functionalization of basal textured Ti-6Al-4V alloy strips with the surface gradient topographic oxide coating, which brings in the gradient distribution of surface conditions including matrix alloy, ordinary TiO_2 film and TiO_2 microwaves on a single strip. High-energy electro pulse is frequently used as an electrically-treated method in improving the materials microstructure and mechanical property. This paper reports firstly the surface modification under EPT aiming to improve the biocompatibility, which will meet the demand of biomaterials in different parts of human beings. Novel TiO_2 microwaves topological structure on the materials surface resulted in better biocompatibility with more active fibroblast bio-reaction including higher cells viability, better physiological morphology and stronger adhesion binding, which is ascribed to surface chemical components, surface energy and specific surface area under EPT manipulation. The key role of forming TiO_2 microwaves structure solely under EPT is the selective effect of the electro pulses going through the textured specimen, which thus builds a selective growth of the oxide and forms the microwaves topological structure on the materials surface. The positive contributions of EPT in the thermodynamics and kinetics of oxide coatings growth are attributed to the reduction of nucleation energy barrier and acceleration of atomic diffusion. Thus, the gradient functionalization of biomaterials can be tuned over several seconds EPT in the titanium alloys, opening an energy-saving and high-efficiency door to diverse biomedical applications including the tissue engineering and biological interfaces.

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