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Anatase-TiO_2와 에탄올의 동시 밀링 공정 후 열처리에 의한 가시광 응답형 광촉매 제조

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We have synthesized a carbon doped titanium oxide powder (C-TiO_2), which shows a good photocatalytic activity under visible wavelength region, by mechanochemical (MC) and heating treatment. The MC operation is carried out by grinding TiO_2 with ethanol (C2H5OH) as a carbon source in air, and subsequent heating is carried out at different temperatures in air. The prepared samples were examined by a series of analytical methods including X-ray diffraction, Thermo-gravimetrical mass spectroscopy, Fourier transform infrared spectroscopy, Specific surface area measurement, X-ray photoelectron spectroscopy (XPS), NOx gas decomposition and Ultraviolet-visible spectroscopy(UV-VIS). XPS analysis particularly illustrates the existence of C-Ti and C-O bindings, suggesting the improvement in photocatalytic ability in the visible light wave range. And the prolonged grinding operation results in decrease in particle size and increase in specific surface area. The effective grinding periods of time and temperature at heating are about 2hr and 200℃, respectively.

Keywords: Grinding, Carbon doping, Carbonate species, Solid-Liquid reaction, TiO2 Photocatalyst.

E-11

In vitro biocompatibility of a reinforced Calcium Phosphate − Calcium Sulfate Injectable bone substitute

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In recent years, it has been tried to develop the efficacy and bioactivity of Calcium Phosphate-Calcium Sulfate injectable bone substitute (IBS) by reinforcing them through varying the amount in its compositions and relative concentrations. In this study, the biocompatibility of a reinforced Calcium Phosphate-Calcium Sulfate injectable bone substitute (IBS) was evaluated which consisted of solution chitosan and citric acid as liquid phase and tetra calcium phosphate (TTCP), dicalcium phosphate anhydrous (DCPA) and Hydroxypropyl-Methyl-Cellulose (HPMC) powder as the solid phase. The mass content of HPMC in liquid phase was varied in arrays of 0%, 2%, 3% and 4% to investigate the effect of HPMC on setting times, compressive strength and in vitro biocompatibolity. The in vitro experiments with simulated body fluid (SBF) confirmed the formation of apatite on sample surface after 14 and 28 days of incubation in SBF. The pH of each sample went to its peak after 7 days of incubation in SBF and then tends to rewind back gradually with the increasing incubation period. MG-63 cells were found to maintain their phenotype on samples and SEM micrograph confirmed that cellular attachment was well. In vitro cytotoxicity tests by an extract dilution method showed that the IBS was cytocompatible for fibroblast L-929.

Keywords: injectable bone substitute, HPMC, Biocompatibility, SBF