

عنوان مقاله:

Synthesis of nano-structured sphene and mechanical properties optimization of its scaffold via response surface methodology

محل انتشار:

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خلاصه مقاله:

Nano-structured sphene (CaTiSiO_5) powder was synthesized via mechanical activation and heat treatment method. The synthesized powder was characterized by X-ray diffraction (XRD), transmission electron microscopy (TEM), and simultaneous thermal analysis (STA). The sphene scaffolds were then fabricated via porogen method (using citric acid). Response surface methodology was successfully used to determine the effects of d (particle size) and %V porogen (volume percent of porogen) on the mechanical behavior of the prepared sphene scaffolds. Moreover, a suitable mathematical model for describing the relationship between the factors (d and %V porogen) and the response (compressive strength) was statistically developed. The use of porogen in the synthesis procedure can change the porosity value of the final scaffold; thus, the compressive strength of the sphene scaffolds varied widely. Statistical analysis results predicted that the maximum value of the compressive strength can be obtained at the following conditions: %V = ۲۵% and $d = ۲۵۰ \mu\text{m}$. At these conditions, the prepared scaffolds possess a compressive strength value as high as $Y \text{ MPa}$.

کلمات کلیدی:

Bioceramics, Mechano-chemical synthesis, mechanical properties, Response Surface Methodology

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