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Modification of Mg-doped fluoridated hydroxyapatite nanoparticles by amino acids as a drug delivering nanobio-polymer composite for tissue engineering

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In the past few years, hydroxyapatite (HA) has been widely used as a bioactive ceramic. Not only does the development of modified-HA by the substitution of Ca ions and OH groups make its chemical composition similar to that of the natural bone tissue, but also improves the in vitro behavior of commercially synthesized HA. Aiming at such capabilities, magnesium-fluoridated hydroxyapatite nanoparticles (Mg-FHA NPs) have been recently developed. But, NPs have high surface energy and therefore, they cannot be well dispersed in a bio-polymer matrix to prepare a polymer/ceramic composite, which is usually required for tissue engineering applications. To resolve this problem, we aimed to modify the surface of Mg-FHA NPs using a few well-known natural amino acids as the cost-effective and environment-friendly bio-materials. As coupling agents, L-leucine, L-isoleucine, L-methionine, L-phenylalanine, L-tyrosine and L-valine amino acids were employed and by performing the sonication technique the surface Mg-FHA NPs was modified. The results confirmed that using amino acid molecules led to uniform dispersion of Mg-FHA NPs in the organic environment by making the surface of NPs hydrophobic, although the length and chemical reactivity of amino acid molecules affected the efficiency of NPs dispersion. The uniform distribution of Mg-FHA NPs could be regarded as a desired condition for polymer/ceramic composite preparation with high applicability for biomedical purposes.

Biography

Zeinab Fereshteh has completed her PhD from Isfahan University of Technology. She is an Assistant Professor at the Institute of Science, High Technology, and Environmental Sciences, Graduate University of Advanced Technology. She has published more than 15 papers in peer-reviewed journals and presented/attended more than 10 conferences in the nano-materials and nano bio-materials fields.

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