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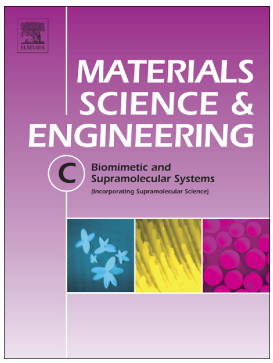

A facile method to synthesize mussel-inspired polydopamine nanospheres as an active template for in situ formation of biomimetic hydroxyapatite

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A facile method to synthesize mussel-inspired polydopamine nanospheres as an active template for *in situ* formation of biomimetic hydroxyapatite

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Abstract:

In this study, Mussel-inspired polydopamine (PDA) nanospheres were synthesized via spontaneous oxidative polymerization of dopamine hydrochloride (dopa-HCl) in a deionized water-alcohol mixed solvent at room temperature and atmospheric air, under alkaline condition. Field-emission scanning electron microscopy (FE-SEM) demonstrated production of sphere-like shape with a smooth surface and tunable size, while monodispersity increased by utilizing isopropanol instead of ethanol owing to lower R_a values based on Hansen solubility parameter (HSP) theory. Dropwise addition of monomer played an undeniable role in the fabrication of uniform and smaller spheres. The difference of the charge repulsion of constructs in the range of pH led to different dispersive behavior in a variety of solvents, exhibiting versatile applications. The presence of active functional groups on the surface of PDA spheres made them an appropriate option for PDA-assisted biomimetic mineralization of hydroxyapatite (HA), which is the result of the interaction between abundant catecholamine moieties in PDA and Ca^{+2} ions in simulated body fluid. Bio-adhesive nature of PDA in water and the presence of amino and hydroxyl functional groups support desirable L929 mouse fibroblast cell spreading. The viability of more than 90% fibroblast cells proved the biocompatibility of polymerized structure. All the