Insights into Apatite Mineralization Potential of Thermally Processed Nanocrystalline $Ca_{10-x}Fe_x(PO_4)_6(OH)_2$

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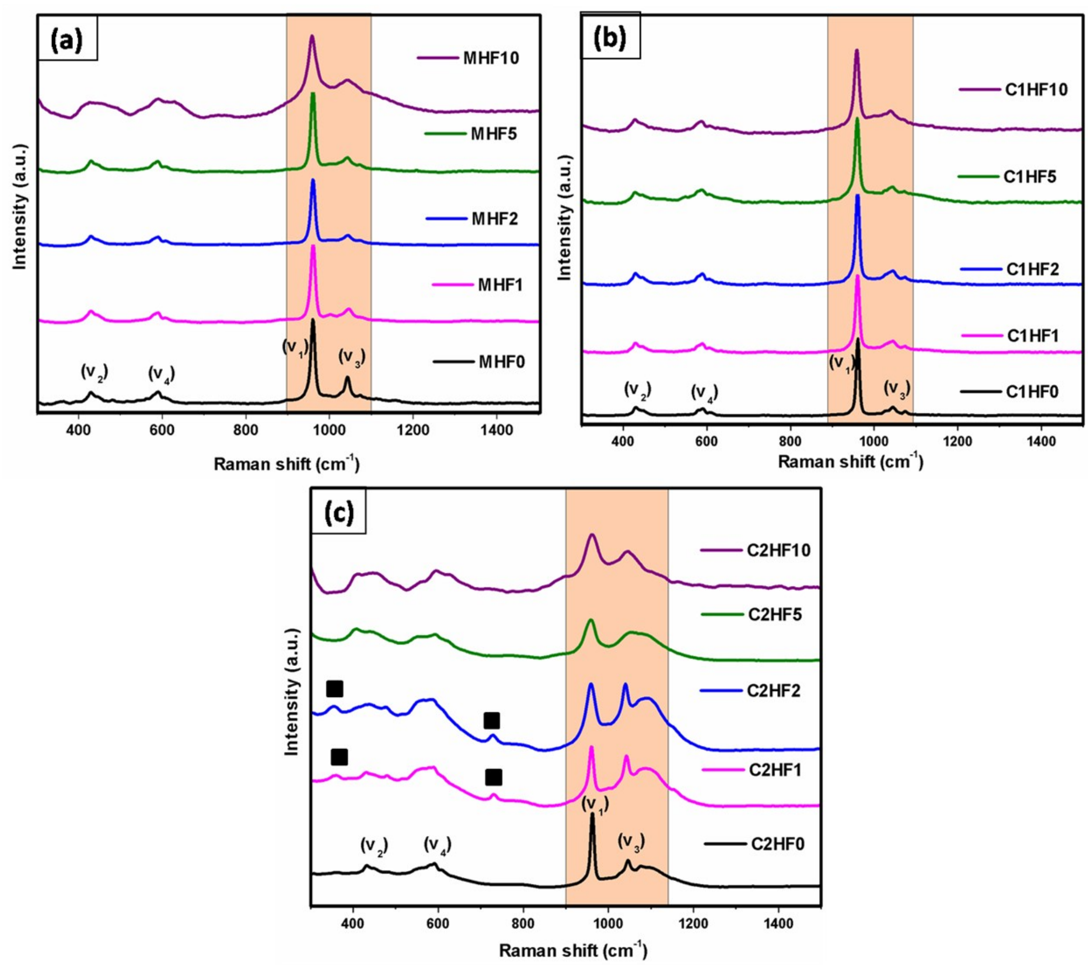

Fig. S1 Raman spectra of pure and iron incorporated nHAp samples treated with (a) microwave, (b) 600°C and (c) 800°C temperatures. A highlighted region in spectra corresponds to changes in PO_4^{3-} (ν_1) mode.

Raman spectra of pure nHAp and iron-incorporated samples are displayed in Fig. S1(a-c). Pure nHAp exhibits a strong symmetric PO_4^{3-} (ν_1) stretching band around 960 cm^{-1} at all thermal treatments. The band at 430 cm^{-1} corresponds to bending (ν_2) vibrational mode of

P–O bond. The two bands resolved at 1040 cm^{-1} and 1080 cm^{-1} can be attributed to asymmetric PO_4^{3-} (ν_3) stretching modes. Another vibrational band 580 cm^{-1} was observed due to bending vibrational character of the P–O (ν_4) bond [1, 2]. The spectra of Fe incorporated samples exhibits all the vibrational bands of pure nHAp as aforementioned. In addition, Fe incorporated nHAp revealed two additional small bands at 357 cm^{-1} and 730 cm^{-1} demonstrating the existence of iron by bonding with oxygen molecules [3, 4], which is more evident from 800 °C calcinated samples. Moreover, increased iron concentration showed peak broadening at 960 cm^{-1} that can be attributed to the improved decomposition rate of nHAp structure, making it more calcium deficient [5] and corroborates with XRD result.

References

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