Supporting Information

Osteoblast compatibility of Minerals Substituted Hydroxyapatite Reinforced Poly(Sorbitol Sebacate Adipate) Nanocomposites for Bone Tissue Application†

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Materials and methods

Optimization study for the synthesis of Poly (Sorbitol Sebacate Adipate) nanocomposites by using microwaveirradiation method

The same procedure followed for the synthesis of M-HAP/PSSA nanocomposites using A CEM Discover microwave synthesizer. The synthesis of M-HAP/PSSA nanocomposites was carried out under different optimized conditions. The Highlighted (in Table 1) optimized conditions are fixed for the synthesis of M-HAP/PSSA nanocomposites. Various conditions were tried to make the composite under microwave(*A CEM Discover microwave synthesizer (Model No: 908010) operating at 180/264 V and 50/60 Hz with microwave power maximum level of 300 W and microwave frequency of 2455 MHz was employed for the microwave assisted experiments done in this work*) irradiation method (Table 1). We have carried out the reaction under different conditions like microwave power 80-120 W (Jeronimo Blanco et al., (2009)[1] and time varying from 2 to 14 min. The optimization of 2 to 8 min, there is the improvement in composite formation. Above 10 min, the expected composite was obtained and it is confirmed by Scanning electron microscope and FTIR spectroscopy. Further, time increases from 10 to 14 min composites were decomposed as their original nature. Likewise microwave power increases from 60 to 120 W, composites was exactly formed at 100 W. Blow 100 W and above 100 W the

composites are not formed and decomposed respectively. So, the optimized time is 10 min and power is 100 watt for the synthesis of PSSA using microwave irradiation method. This was confirmed by the repetition of the experiments as trice. The FTIR spectrum and SEM images were represented as in Figure S5, S7 and S6, S8.

Also, we have carried out the reaction under different weight percentage of ceramic addition like M-HAP content 0-10 Wt. %. The optimization of 0 to 10 Wt. %., there is great the improvement in composite formation. Above 5 Wt. %, the expected composite was obtained, and it is confirmed by Mechanical testing analyzer (CMT4104 testing machine) and Differential Scanning Calorimeter (DSC 822e, Mettler Toledo) both results are clearly discussed in result and discussions section.

Table. S 1.

Optimization of time					Optimization of power (W)			
Entry	Composites	Time (min)	Microwave Watts	Observation	Adipic	Time (min)	Microwave Watts	Observation
1	PSSA/M-HAP	2	100	Liquid nature	PSSA/M-HAP	10	60	Liquid nature
2	PSSA/M-HAP	4	100	Jelly	PSSA/M-HAP	10	70	Jelly
3	PSSA/M-HAP	6	100	Viscous	PSSA/M-HAP	10	80	Viscous
4	PSSA/M-HAP	8	100	Viscous	PSSA/M-HAP	10	90	High viscous
5	PSSA/M-HAP	10	100	Beads like	PSSA/M-HAP	10	100	Beads like
6	PSSA+M-HAP	12	100	High viscous	PSSA/M-HAP	10	110	Charring
7	PSSA+M-HAP	14	100	Charring	PSSA/M-HAP	10	120	Charring

RESULT AND DISCUSSIONS

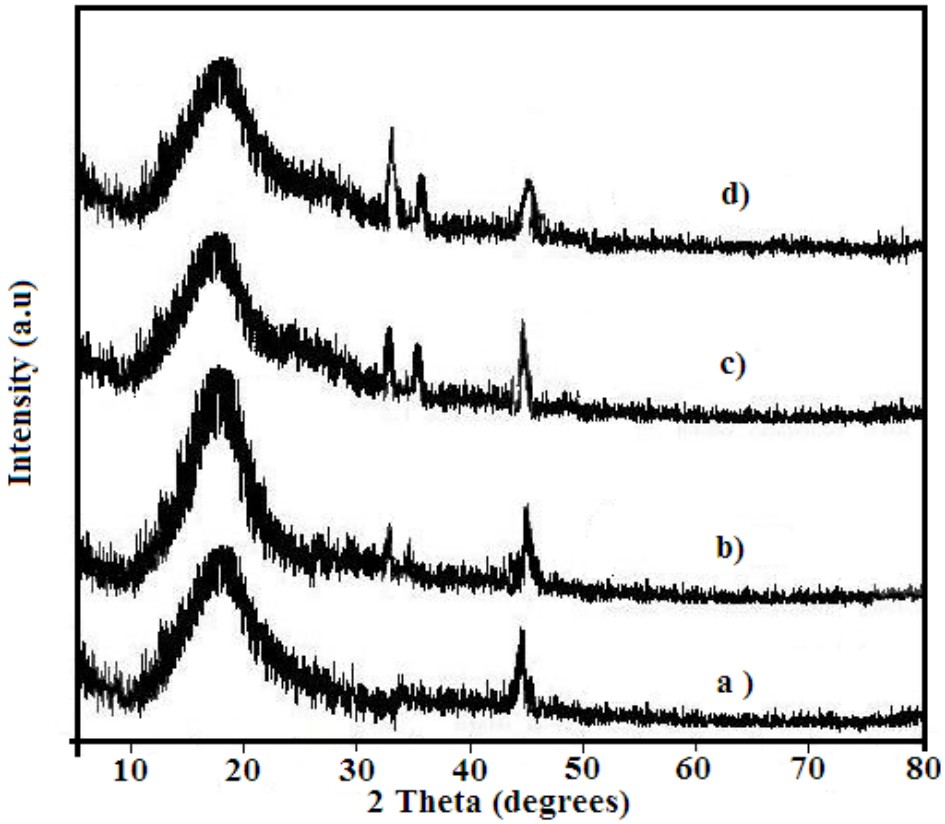

Fig. S 1 XRD patterns of (a) pure PSSA (b) 1Wt % of M-HAP(c) 5Wt % of M-HAP and (d) 10Wt % of M-HAP

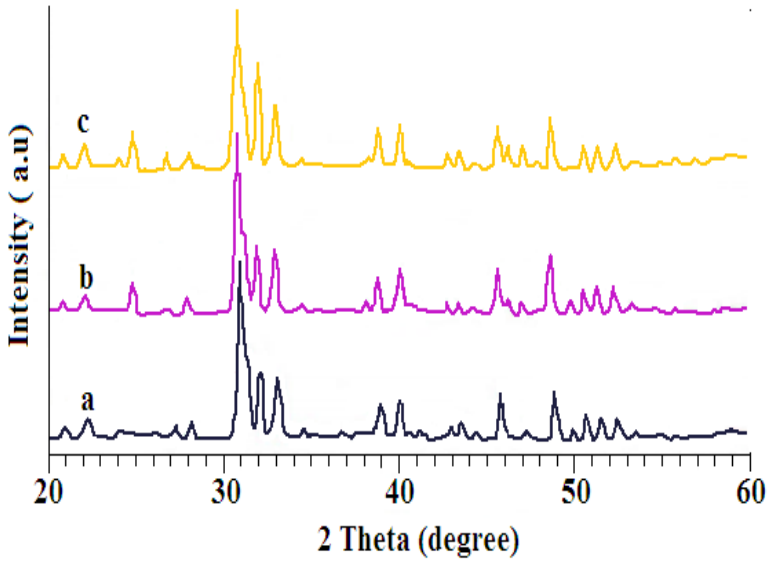

Fig. S2. Phase composition of the 10 Wt% of M-HAP in PSSA nanocomposite samples soaked in SBF solution for different days (a) 1, (b) 3 and (c) 7 days.

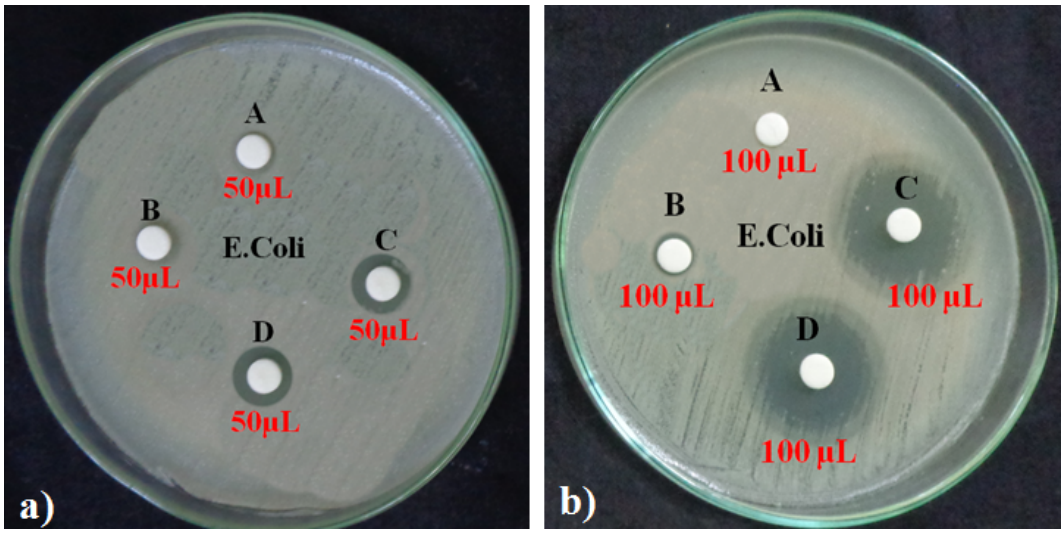

Fig. S 3. Antimicrobial activity of (A) PSSA, (B) HAP, (C) M-HAP and (D) 10Wt% of M-HAP in PSSA composites against E. Coli with different concentration (a) 50µL and (b) 100µL.

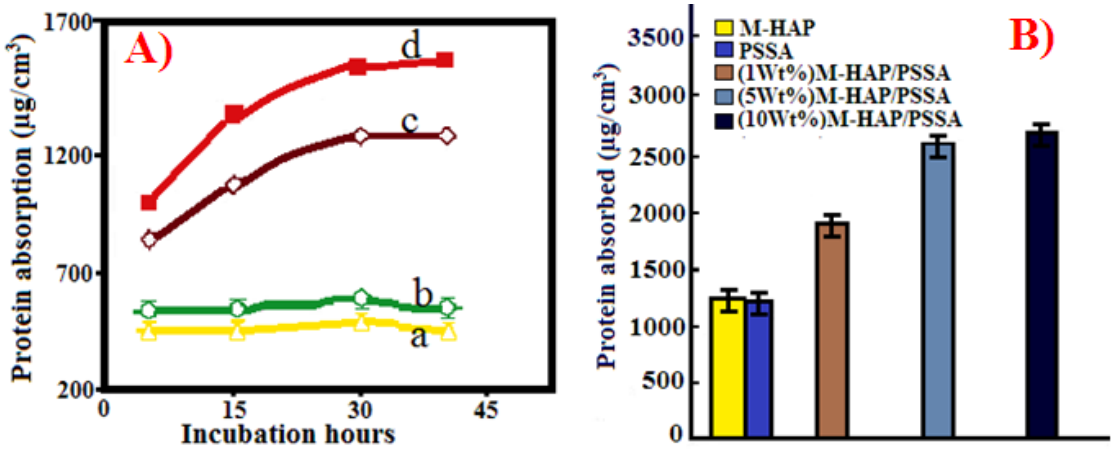

Fig. S 4 Protein adsorption of (A) M-HAP(a), PSSA(b), 1Wt% of M-HAP (b), 5Wt% of M-HAP (c), 10Wt% of M-HAP (d); (B) bar diagram

Table S 2. Mechanical and thermal properties of M-HAP/PSSA composites.

M-HAP (%)	Tensile strength (MPa)	Tensile Modulus (MPa)	Elongation at break (%)	Tg (°C)
0	16.10 ± 1.53	613.76 ± 70.10	49.10 ± 3.90	39.92
1	18.51 ± 1.79	680.75 ± 96.25	32.76 ± 3.45	40.91
5	20.23 ± 3.08	890.60 ± 140.80	25.08 ± 2.50	41.52
10	22.10 ± 2.69	1058.40 ± 114.15	9.12 ± 2.25	42.70

REPRODUCIBILITY RESULTS

Figures

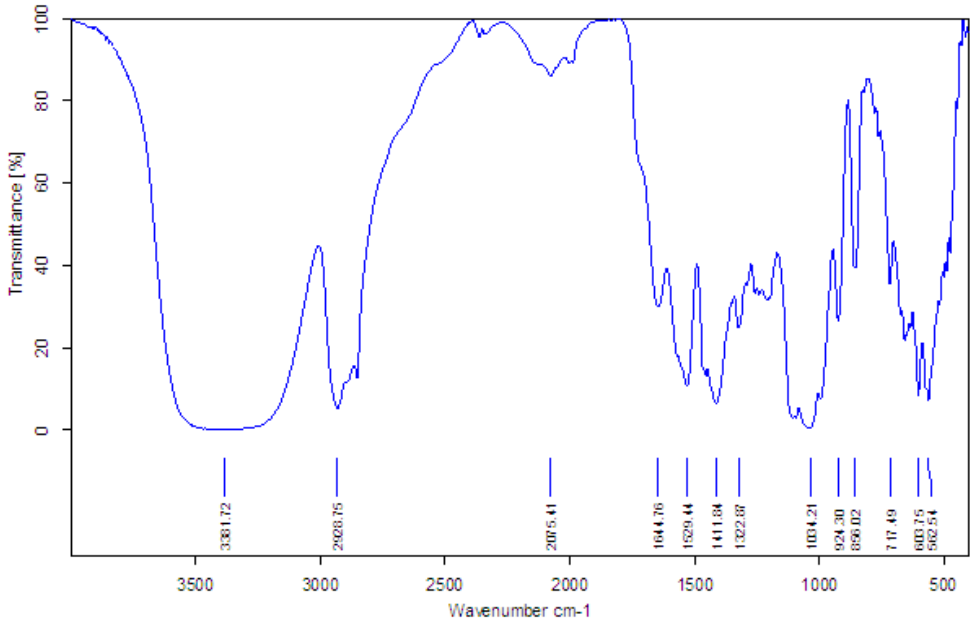

Fig. S5. IR spectra of 10 Wt% of M-HAP in PSSA post polymer

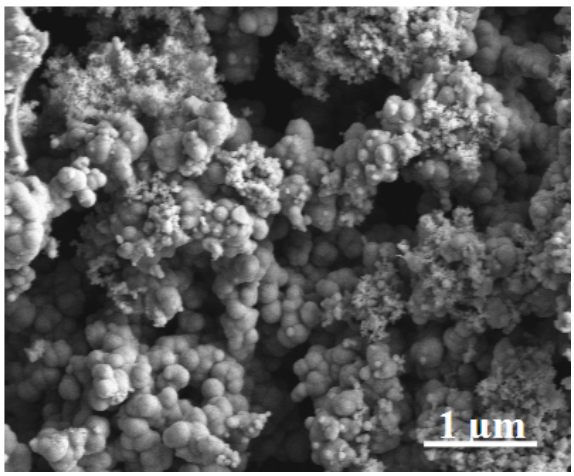

Fig. S6. SEM image of 10 Wt% of M-HAP in PSSA post polymer

Statistical analysis results of Poly (Sorbitol Sebacate Adipate) nanocomposites synthesis by using microwave irradiation method

Reproducibility results

FTIR Results

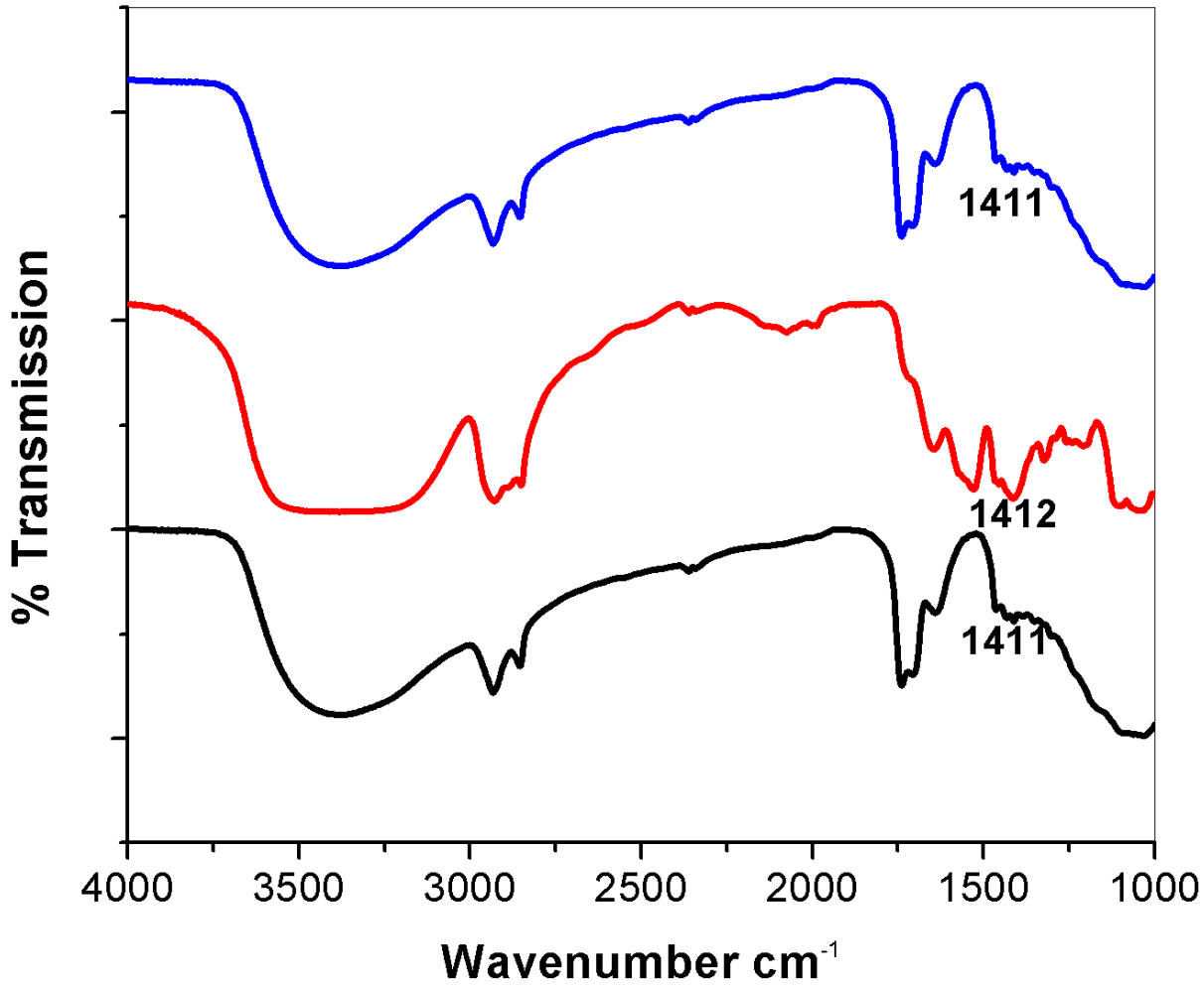

Fig.S7 IR spectra of 10 Wt% of M-HAP in PSSA post polymer.

SEM Results

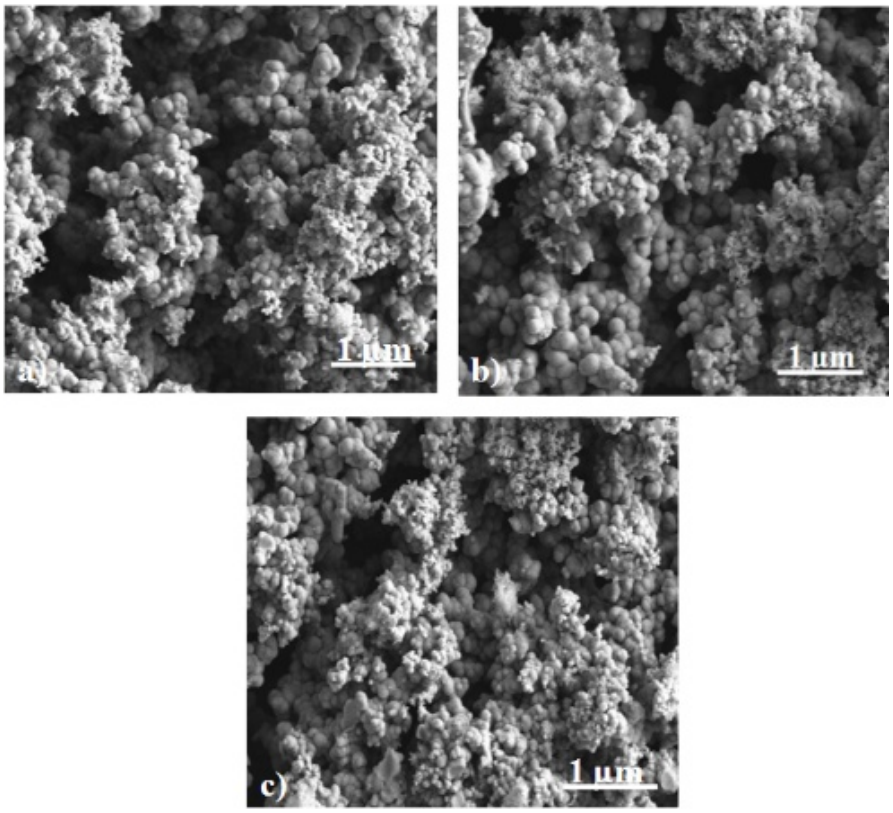

Fig.S8 SEM results of 10 Wt% of M-HAP in PSSA post polymer.

Reference

1. Irene R. De´gano, Lluı´s Quintana , Marta Vilalta, David Horna, Nuria Rubio, Salvador Borros, Carlos Semino, Jero´nimo Blanco, , Biomaterials (2009), 30, 1156–1165.