Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Analysis of Solvents induced Nanoporous PMMA-Bioglass® Monoliths by Phase separation method: its Mechanical and *in vitro* biocompatible studies

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Elemental confirmation analysis:

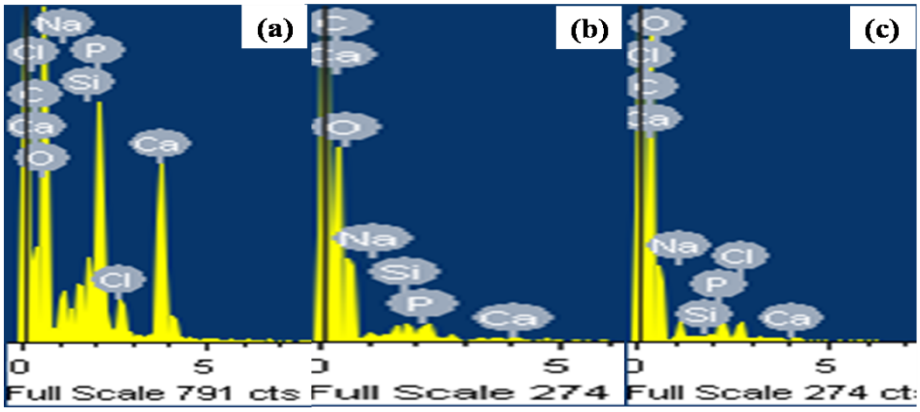

Fig S.1 Elemental Dispersive anlaysis of the scaffolds prepared using (a) chloroform, (b) acetone and (c) ethanol and water mixture.

Fig. S.1 exemplifies the EDS spectra of the scaffolds, where all the scaffolds confirm the elemental presence of essential PMMA/Bioglass® composites. On comparing the spectral intensity of the all the scaffolds the chloroform samples (Fig 3.2(a)) shows higher intensity in all the elements except carbon, with respect to acetone (Fig 3.2(b)) and ethanol/water mixture (Fig 3.2(c)). This may be due to the dense Bioglass® network formation at the surfaces[1].

Optical properties

To understand the various defects and diseases in the implanted bone or teeth, the optical techniques were widely used for diagnostic applications. Hence a clear understanding on the optical properties of the scaffolds has to be studied before implantation. In our present studies the transmission and reflectance spectra of the scaffold material was exemplified in fig 3.10. Whereas in transmission mode, the photon is transmitted through the scaffold and for the reflectance mode the photon is reflected from the scaffold surface without penetration or interaction. The transmission and reflectance peak at 283 which is present in all the scaffolds is a standard spectrum of calcium phosphate compounds such as enamel [2] For hydroxyapatite the transmission % is around 30% and reflectance % is around 60% approximately in the visible region [3]. These optical properties may vary depends on the surface macro and micro roughness and the chemical composition of the scaffolds. In our present scenario, the highest porous ethanol/water mixture solvent prepared scaffold shows nearly 100% reflectance and transmittance. For pure PMMA itself the transmittance percentage is only 80%. This may be due the mixed porous structure in the scaffold material which is expected to higher transparency to the cellular and blood interaction and higher bioactivity.

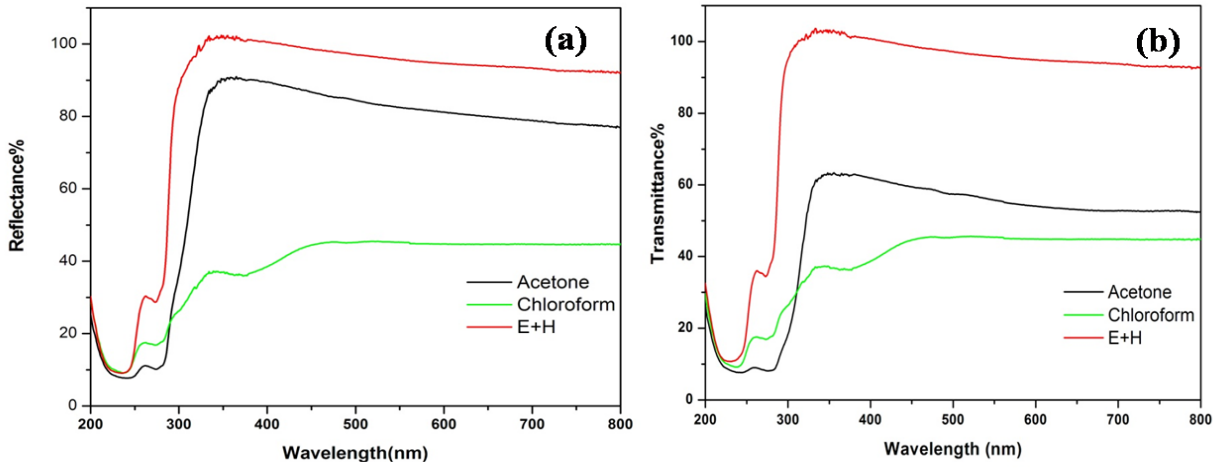

Fig.S.2. The UV-Vis spectra depicts 100% reflectance and 100% transmittance for ethanol and water mixture solvent prepared scaffolds

Surface Morphological Analysis:

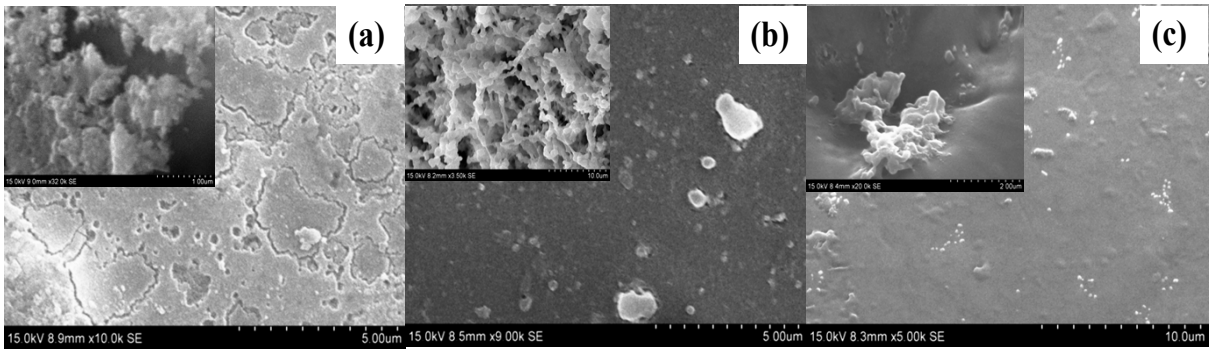

Fig. S.3. Surface morphology of the monoliths from the solvents using (a) chloroform, (b) acetone and (c) ethanol and water mixtureimmersed after 3 days

The immersion studies shows surface morphological transformation on the third day itself (Fig. S.3). At the end of 28 days immersion, all the surface morphology is completely changed to a high dense monolayer HCA structure (Fig. S.4). The variation from the scaffold to the HCA layered formation is clearly visualized in acetone and ethanol/water mixed scaffolds. In acetone scaffolds there seems a mesoporous structure of HCA, which depicts that the rate of formation of HCA lags behind in comparison with the other scaffolds.

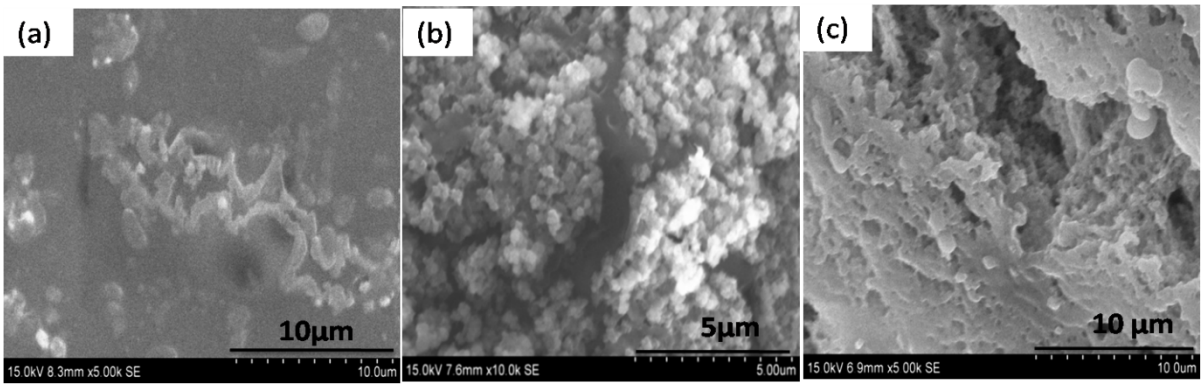

Fig. S.4. Surface morphology of the scaffolds prepared from the solvents using (a) chloroform, (b) acetone and (c) ethanol and water mixture shows complete surface covered by hydroxyl calcium phosphate layer.

pH variation of the SBF solution:

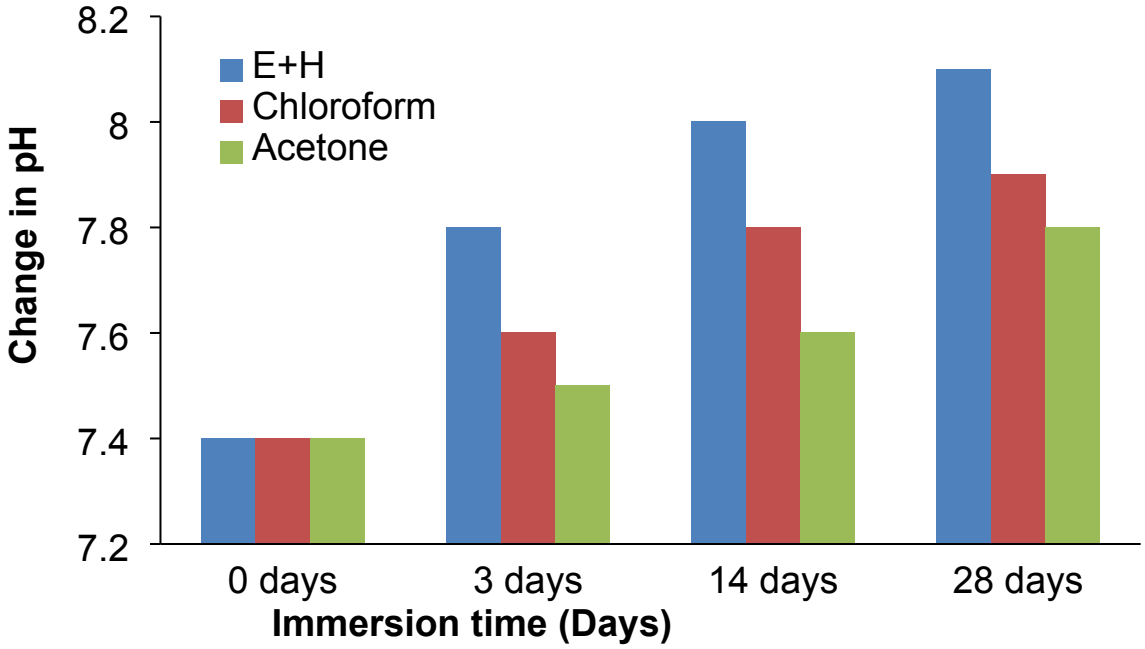

Fig.S.5. pH variation of the Simulted Body Fluid (SBF) with respect to the day of immersion.

Changes in solution pH are very important to analyze when bioactive glasses are dissolved in simulated body fluids. pH values are easily measured with a pH-meter. In fig S. 4The pH of the solution increased sharply for the first three days reaching a maximum of 7.8 for E+H compared with the initial pH of 7.4. This is due to the fast release of Na^{+} and Ca^{2+} ions into the surrounding solution through exchange with H^{+} or H_3O^{+} ions. After day 3, the pH increases more gradually because part of the released calcium is used to form CaO-P_2O_5- rich film, decreasing the Ca release kinetics[3]. With pro- longed immersion, the pH reached a near saturated state for E+H and it prolong increase for Acetone .

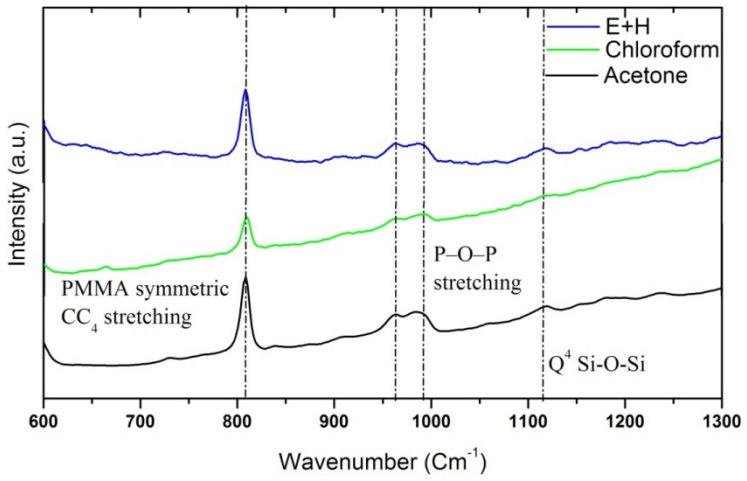

Fig S.6. Raman spectra of the scaffolds immersed after 14 days in simulated body fluid

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