



Abstract

The aim of this project is: to create a model of carious dentin in a tooth-like structure using hydroxyapatite-gelatin mineralized through an alternate soaking process (ASP).

Introduction

The transference of hand skills necessary to be confident in practice is a subjective issue in Dental Schools. Right now, practice models are monolithic and lack the sensitive characteristics of carious tissue. Using hydroxyapatite crystals within a collagen gelatin we reproduce a model similar than the natural affected tissue for students to learn on.

Methods

A 1 M solution of CaCl_2 in 200 mL of diH_2O and a .25 M solution of Na_2HPO_4 in 200 mL of diH_2O . Then dissolve TRIS HCl into each solution and buffer the Ca^{2+} solution to a pH of 7.4 with 5 M NaOH. Add 25 gr of porcine gelatin to each solution after the solutions reach a temperature of 37 °C. A mold is then subjected to an alternate soaking process, soaking in the Ca^{2+} solution, deionized water, the PO_4^{3-} solution and deionized water, respectively. This process is repeated until the mold is full and then the hydroxyapatite-gelatin is dehydrated.

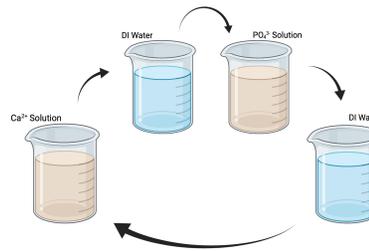


Figure 1

Results

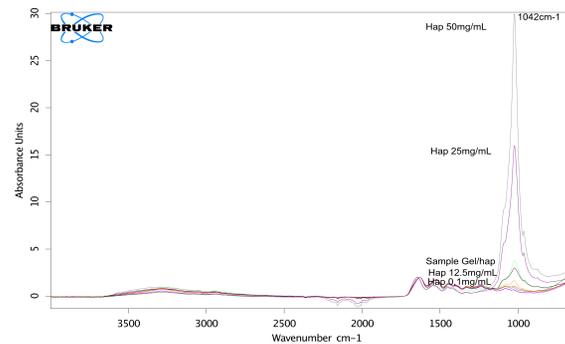


Figure 2

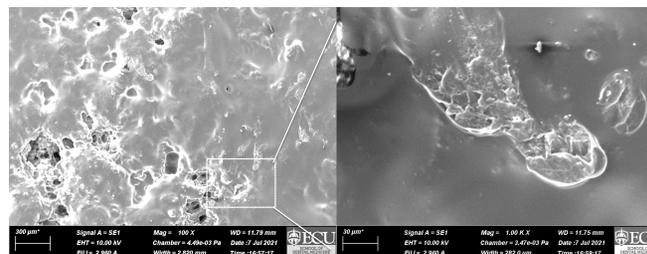


Figure 3

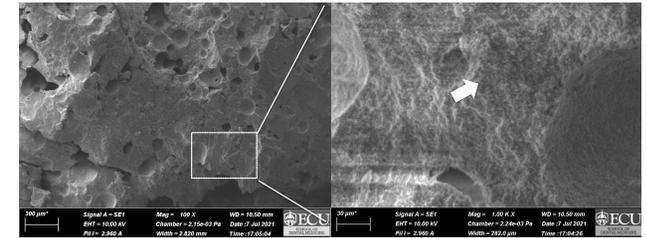


Figure 4

Discussion

Figure 2 is an FTIR spectrum created with readings of hydroxyapatite-gelatin with known concentrations of hydroxyapatite. The FTIR confirms the Hap presence (peak at 1042 cm^{-1}) at $\sim 16.17\text{ mg/mL}$ concentration. Figures 3 and 4 are SEM images of the hydroxyapatite-gelatin formed during ASP. The crystals are clear and easily comparable to those in figure 4 (arrow), which is a known hydroxyapatite-gelatin mixture.

Conclusions

Hydroxyapatite-gelatin formed through the alternate soaking process bares similar characteristics to carious dentin and with further investigation should be able to be used to create models for future dental students to practice on.

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