

INTRODUCTION

Dental bleaching has become a common procedure in aesthetic dentistry. Materials and protocols are designed to be used in dental offices or at home. The active substance of dental bleaching materials are peroxide-containing materials which remove intrinsic and/or extrinsic tooth discolorations.

OBJECTIVES

The present study is evaluating the effect of hydrogen peroxide on the enamel. This *in vitro* study is using the non invasive Optical Coherence Tomography (OCT) to study the effect of dental bleaching materials 16% carbamide peroxide over the enamel. The material has indication for home bleaching.

METHODS & MATERIAL

Twenty unbroken human teeth were sectioned longitudinally from the buccal to lingual surface using a low-speed diamond saw. The samples were cleaned with dedicated brushes and fluoride free paste. The Carbamide Peroxide gel was laid only on the buccal enamel and then observed with the Optical Coherence Tomograph on longitudinal section. The bleaching dental material was applied on the buccal enamel surface. The sample was positioned in a silicone key. The active substance of Opalescence is Carbamide Peroxide 16% indicated for home bleaching treatment.

The action of the active substance was registered in real time for thirty minutes.



Figure 1. The sample



Figure 2. Bleaching material



Figure 3. Optical Coherence Tomography

OCT uses two single mode directional couplers with a superluminescent diode as source at 1300 nm. The scanning procedure is similar to that used in any confocal microscope, where the fast scanning is en-face (line rate) and the depth scanning is much slower (at the frame rate). The en-face scans provide an instant comparison to the familiar sight provided by direct view. The imagistic investigation is non-invasive.

Optical Coherence Tomography (OCT) is a powerful and very sensitive tool used to characterize the optical properties and to realize imaging data of superficial tissue. The registered micrometer depth resolution allows in vivo measurement of thickness, area and volume in the tissue.

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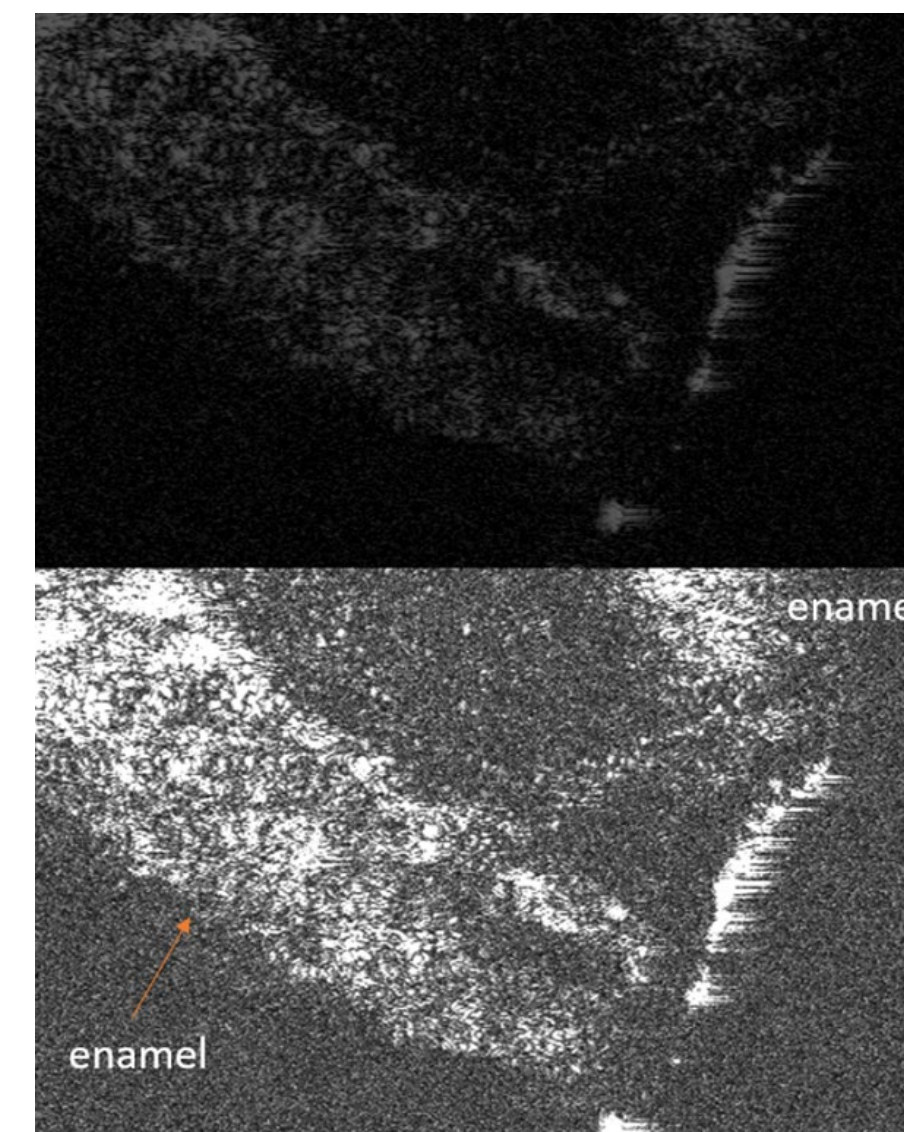


Figure 4. En-face image of the sample and the carbamide peroxide layered on enamel

The depth resolution in OCT technology is given by the optical source line width. OCT is a remarkable method for high resolution imaging of superficial tissue with penetration depths of up to 2–3 mm, depending on the scattering and absorption properties of the tissue. The technology can reach a depth resolution of OCT better than 15 μm and a larger band width source allows a resolution depth of 2 μm .

RESULTS and CONCLUSION

The Carbamide Peroxide action over enamel was registered for 30 minutes. It can be observed due to materials optical characteristics that changes appear on the enamel surface. The images captured before and during the chemical treatment with Carbamide Peroxide in time domain C Scan OCT have revealed the capacity to penetrate the dental hard tissue structure and to produce superficial modification and into the tissues structure due to oxidative process.

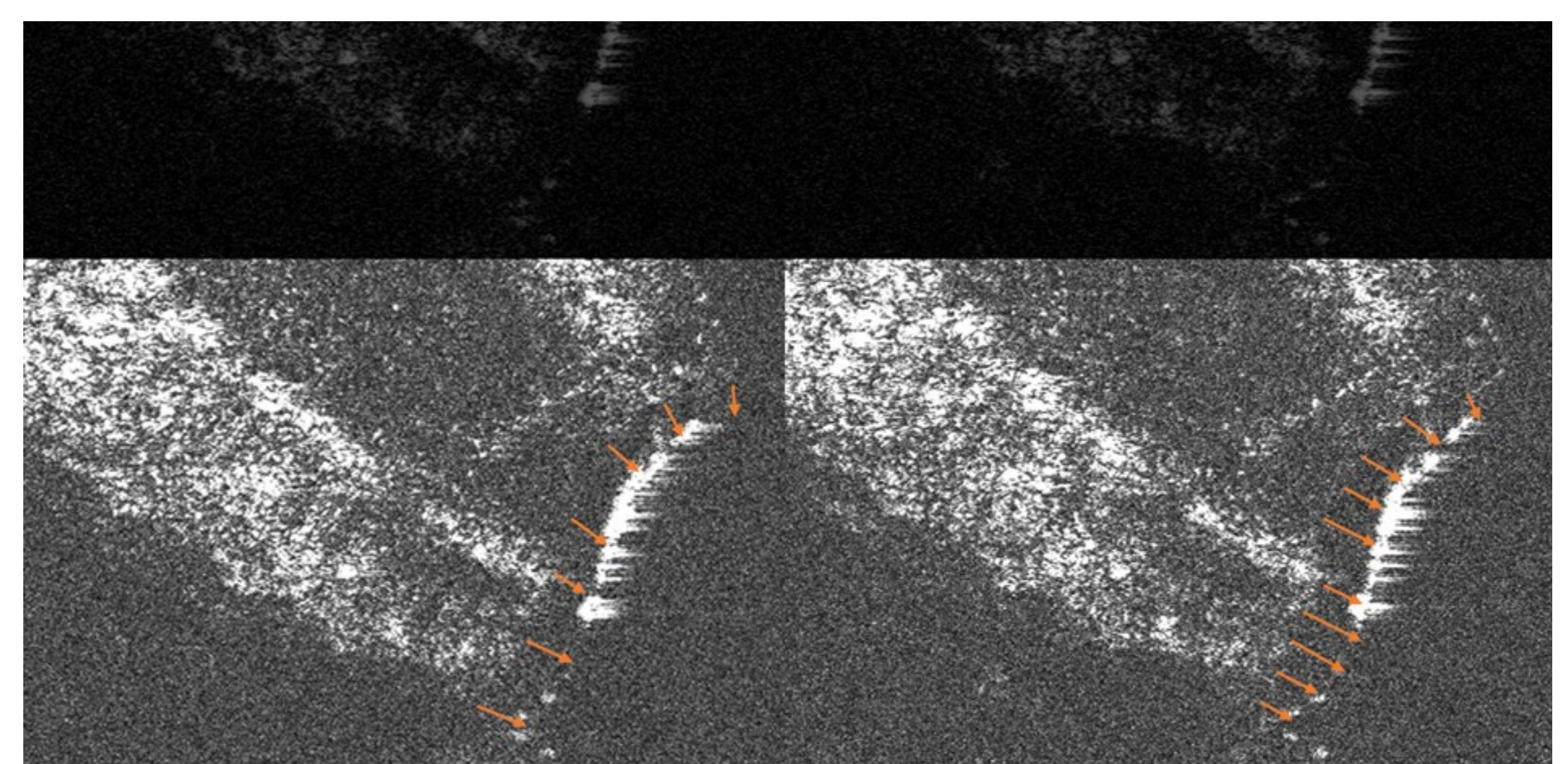


Figure 5. C-Scan immediately after carbamide peroxide

Figure 6. C-Scan after 30 minutes of carbamide peroxide

The high susceptibility to fracture of teeth with internal bleaching treatment and the side effects of excessive external bleaching treatments may be related to the high diffusion and oxidative reactions of bleaching agents. Further studies

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