Photothermal Radiometry Analysis of Tooth Heating for Short Periods of Time

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Nowadays, the development of auxiliary techniques for the study and manipulation of teeth has become a field of major interest for its multiple applications in the fields of archaeology, medicine, and dentistry. Strong heating of teeth by different physical methods is one of the most important factors affecting this kind of material. Heating could induce ablation, crystallization, cleaning, and damage of the structure of the organic matrix or the inorganic material. Lasers have been used in dental treatments as a tool for drilling, cutting, in the preparation of cavities for restoration, and in the detection of carious, as well as for a potential therapy for the prevention of carious, etc.

On the other hand, archaeological studies involve the analysis of sample material that was in some cases put in direct contact with fire. In these cases, it is important to evaluate the extent of the damage as well as the conditions under which the sample was heated directly. In this work, the effect of direct heating for short periods of time using either a high powered laser or a flame on samples of teeth is investigated. The effects of the heating are evaluated using photothermal radiometry as a tool for the determination of the thermal properties and for obtaining photothermal images of the tooth samples. X-ray diffraction and optical microscopy are used as auxiliary techniques.

Our results are compared with samples obtained from burials in which burned human remains were found.