

Publication

Laser-induced breakdown spectroscopy as a potential tool for autocar- bonization detection in laserosteotomy

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)

ID 4483288

Author(s) Abbasi, Hamed; Rauter, Georg; Guzman, Raphael; Cattin, Philippe C.; Zam, Azhar

Author(s) at UniBasel [Rauter, Georg](#) ; [Guzman, Raphael](#) ; [Cattin, Philippe Claude](#) ; [Zam, Azhar](#) ; [Abbasi, Hamed](#) ;

Year 2018

Title Laser-induced breakdown spectroscopy as a potential tool for autocarboxylation detection in laserosteotomy

Journal Journal of biomedical optics

Volume 23

Number 7

Pages / Article-Number 1-7

Keywords laser-induced breakdown spectroscopy, laserosteotome, carbonized bone, smart surgery, feedback, differentiation, MIRACLE.

In laserosteotomy, it is vital to avoid thermal damage of the surrounding tissue, such as carbonization, since carbonization does not only deteriorate the ablation efficiency but also prolongs the healing process. The state-of-the-art method to avoid carbonization is irrigation systems; however, it is difficult to determine the desired flow rate of the air and cooling water based on previous experiments without online monitoring of the bone surface. Lack of such feedback during the ablation process can cause carbonization in case of a possible error in the irrigation system or slow down the cutting process when irrigating with too much cooling water. The aim of this paper is to examine laser-induced breakdown spectroscopy as a potential tool for autocarboxylation detection in laserosteotomy. By monitoring the laser-driven plasma generated during nanosecond pulse ablation of porcine bone samples, carbonization is hypothesized to be detectable. For this, the collected spectra were analyzed based on variation of a specific pair of emission line ratios in both groups of samples: normal and carbonized bone. The results confirmed a high accuracy of over 95% in classifying normal and carbonized bone.

Publisher Society for Optics and Photonics (SPIE)

ISSN/ISBN 1083-3668 ; 1560-2281

URL <https://www.spiedigitallibrary.org/journals/Journal-of-Biomedical-Optics/volume-23/issue-7/071206/Laser-induced-breakdown-spectroscopy-as-a-potential-tool-for-autocarboxylation/10.1117/1.JBO.23.7.071206.short?SSO=1>

edoc-URL <https://edoc.unibas.ch/65172/>

Full Text on edoc Available;

Digital Object Identifier DOI 10.1117/1.JBO.23.7.071206

PubMed ID <http://www.ncbi.nlm.nih.gov/pubmed/29500876>

ISI-Number WOS:000441058300008

Document type (ISI) Journal Article

Top-publication of... Abbasi, Hamed ;