

# The Review of Laser Engineering

THE LASER SOCIETY OF JAPAN

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ONLINE ISSN : 1349-6603

PRINT ISSN : 0387-0200

## The Review of Laser Engineering

Vol. 31 (2003) , No. 5 p.342

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### Real-Time Monitoring of the Surface Modification of Root Dentin Using MIR-FEL-Induced Acoustic Waves

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(Received: August 22, 2002)

**Abstract:** For a non-invasive laser treatment, a real-time and non-contact monitoring technique is needed. We have investigated the extent of the surface modification of root dentin using photoacoustic spectroscopy (PAS), and have discussed the applicability of PAS technique to *in vivo* monitoring during laser treatment. Temporal behaviors of laser-induced acoustic waves were measured with an audible microphone. The extent of the surface modification, such as morphological and chemical changes, was evaluated by using information on the ablation depth and absorption spectrum of the irradiated dentins. The morphological and chemical changes of the irradiated dentin are respectively available for caries removal and increased acid resistance for root surface caries therapy. From the observations, it was found that time-resolved measurement of acoustic waves leads to a real-time understanding on the extent of the morphological change of the irradiated dentin. We have demonstrated the applicability of an *in vivo* monitoring technique involving PAS for root surface caries therapy.

**Key Words:** [Real-time monitoring](#), [Photoacoustic spectroscopy](#), [Root surface caries](#), [Surface modification](#), [Root dentin](#)

To cite this article:

Hiroyuki NAGATA, Manabu HEYA, Shu SANO, Takeyuki UCHIZONO, Yuichi HASHISHIN and Kunio AWAZU: The Review of Laser Engineering, Vol. **31**, (2003) p.342 .

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doi:10.2184/laj.31.342

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