

**Morphological Modification in the Enamel
with Dye-assisted Diode Laser (960nm) Irradiation**

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This study examines the structural modifications induced in dental enamel under dye-assisted diode laser irradiation at wavelength of 960 nm. The aim of this study is to verify if this laser-assisted treatment increases the enamel's resistance against acids attack and therefore makes the enamel less vulnerable to caries decay. For this purpose we irradiated a series of seven identically prepared enamel samples of human teeth, extracted and maintained in a saline solution prior to irradiation. The samples were cut in slices and their surface polished. We then applied a chromophorous ink to the enamel surface. Half of the painted enamel was treated with diode laser radiation, the other one was the control. The final samples were observed and analyzed under SEM. All samples were irradiated with the diode laser operating in a quasi-continuous mode, emitting 10 Watt of average power at 20% duty cycle, in order to minimize thermal effects. Under these conditions the laser emits pulses with 10 Watt of peak power and variable duration. We progressively decreased the pulse duration from 50 ms on the first sample to 1 ms on the last sample.

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The results of the SEM showed that all samples have a homogeneously, resolidified surface on the irradiated part of the enamel. Most importantly, the variation of the pulse duration showed to be a precise tool for control of the thickness of the resolidified layer causing a porosity and roughness decrease of the enamel surface at smaller pulse duration.

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**BOND STRENGTH OF ER:YAG LASER IRRADIATED ENAMEL :
EFFECTS OF ULTRASONIC SCALING & AIR- POWDER POLISHING**

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It was hypothesized that the application of ultrasonic scaler (ODONTSON/Goof) and the air-powder polisher (CLEAN JET/Dentcraft) to the Er:YAG laser irradiated enamel could improve the bond strength of composite resin to the enamel. The purpose of this study was to investigate the effects of ultrasonic scaling and air- powder polishing on tensile bond strength of composite resin to the Er:YAG laser (The KaVo K.E.Y Laser® 1242) irradiated enamel.

21 extracted human incisors were used. Flat enamel surfaces were prepared and irradiated with an Er:YAG laser at 4Hz and 200mJ, with water cooling. The teeth were divided into 3 groups: Gr.1 (Single Bond and Z100/3M); Gr.2 (ultrasonic scaling for 5sec. Single bond and Z100); Gr.3 (air -powder polishing for 5sec. /Single Bond and Z100). The restoratives were applied in a plastic mold with a bond diameter of 2.4mm. Tensile bond strengths were determined after storage in moisture box at 37_ for 24hours (n=7). The surfaces of specimens were observed by SEM.

The following results, in MPa, were found : Gr.1 7.50±2.7 ; Gr.2 16.20±3.0 ; Gr.3, 13.93±3.4. A one-way ANOVA revealed significant differences for bond strength values by the surface treatment methods (p0.05). There were significant differences among 3types of specimen. From the results, it can be concluded that the application of ultrasonic scaler and air-powder polisher improved the tensile bond strength of composite resin to the Er:YAG laser irradiated enamel.

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