

³ State University of Ponta Grossa, Ponta Grossa, Brazil

Purpose / Aim: This study evaluated the effects of addition of lithium-doped bioactive glass microparticles (μ BGLi) into a universal adhesive system on its biological properties such antimicrobial activity (AMA) and cytotoxicity (CTX), as well as mechanical properties such Knoop microhardness (KHN) and in vitro degree of conversion (v-DC),

Materials & Methods: μ BGLi was added to a universal adhesive at different concentrations (0% [control, commercial adhesive]; 5, and 10 wt%). The AMA was evaluated against *Streptococcus mutans*, and CTX was assessed using the GMSC cell-line. For KHN and v-DC, specimens were tested after 24 hours (24h) and 28 days (28d) of storage in water. Data were analyzed statistically ($\alpha = 0.05$).

Results: The addition of 5% of μ BGLi increase AMA ($p < 0.05$), while CTX remained unchanged in adhesives containing μ BGLi ($p > 0.05$). KHN remained stable with the addition of 5% and 10% of μ BGLi at both 24h and 28d, but showed significantly higher values compared to the control after 28d ($p < 0.05$). v-DC did not change with the incorporation of μ BGLi.

Conclusions: The addition of μ BGLi in concentrations up to 5 wt % into a universal adhesive can enhance antimicrobial activity without biological hazards, without compromising mechanical properties.

<https://doi.org/10.1016/j.dental.2026.03.121>

110

Sandblasting effect on roughness surface and adhesive properties to dentin

F Bustos ^{*1}, R Ñaupari-Villasante ², L Hilgert ³,
F de Oliveira ⁴, R Falacho ⁵, JC Ramos ⁵, MF Gutierrez ¹,
AD Loguercio ²

¹ Universidad de los Andes, Santiago, Chile

² Universidade Estadual de Ponta Grossa, Ponta Grossa, Brazil

³ Universidade de Brasília, Brasília, Brazil

⁴ Universidade de Aveiro, Aveiro, Portugal

⁵ Universidade de Coimbra, Coimbra, Portugal

Purpose / Aim: This study evaluated the effect of different sandblasting particles and techniques on dentin surface roughness and the longevity of the adhesive properties of a universal adhesive system.

Materials & Methods: Surface roughness analysis was performed using 3D optical profilometry on dentin discs obtained from 10 sound molars ($n = 10$), each divided into the following groups: Control (no sandblasting), dry sandblasting (25 μ m and 50 μ m aluminum oxide), and wet sandblasting (29 μ m and 53 μ m aluminum oxide, and bioglass). For bond strength (BS) and nanoleakage (NL) tests, 96 sound third molars were assigned to experimental groups followed by the application of Scotchbond Universal Plus using either the etch-and-rinse or self-etch strategy ($n = 8$), evaluated immediately and after thermocycling (2500 cycles).

Results: Surface roughness analysis was performed using 3D optical profilometry on dentin discs obtained from 10 sound molars ($n = 10$), each divided into the following groups: Control (no sandblasting), dry sandblasting (25 μ m and 50 μ m aluminum oxide), and wet sandblasting (29 μ m and 53 μ m aluminum oxide, and bioglass). For bond strength (BS) and nanoleakage (NL) tests, 96 sound third molars were assigned to experimental groups followed by the application of Scotchbond Universal Plus using either the etch-and-rinse or self-etch strategy ($n = 8$), evaluated immediately and after thermocycling (2500 cycles).

Conclusions: It was concluded that sandblasting increased dentin roughness, and its impact on adhesion significantly varied according to particle size/moisture and the adhesive strategy used, with no evident advantage in long-term performance.

Funding:

Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) - 304444/2025-1; Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) - Code 001.

<https://doi.org/10.1016/j.dental.2026.03.122>

111

Determining the concentration of TiO₂ incorporation into Biosilicate-enriched bleaching gels

B Santos ¹, V Hutema ², M Queiroz ², G Santos ¹, M Trevelin ³,
A Lima ², R Dascanio ¹, V Cavalli ¹, M Kury ^{*2}

¹ University of Campinas, Piracicaba, Brazil

² Paulista University, São Paulo, Brazil

³ Federal University of São Carlos, São Carlos, Brazil

Purpose / Aim: To determine the optimal concentration of titanium dioxide (TiO₂) to be incorporated into experimental bleaching gels enriched with Biosilicate (BioS)

Materials & Methods: Experimental gels composed of carboxymethylcellulose, 10% BioS, and 1%, 2%, or 3% TiO₂ were mixed with hydrogen peroxide (HP) and subjected or not to violet LED light. The gels were characterized through digital titration and photocatalytic activity analysis. Subsequently, bovine enamel-dentin discs were randomly assigned to groups ($n = 10$) based on bleaching protocols: 35% HP (commercial), 6%HP, 6%HP + BioS, 6%HP + BioS + 1%TiO₂, 6%HP + BioS + 2%TiO₂, and 6HP% + BioS + 3% TiO₂, with or without LED irradiation. Three bleaching sessions of 30 minutes each were performed at 7-day intervals, with specimens stored in artificial saliva among sessions. The whiteness index change (Δ WID) was measured using a hand-held spectrophotometer 14 days elapsed from bleaching and submitted to two-way ANOVA and Tukey's test ($\alpha = 5\%$).

Results: Irradiation of 6%HP with LED significantly increased the Δ WID; however, it did not eliminate the significant difference compared to 35% HP with LED. Among the light-irradiated groups, the only gels that rendered Δ WID without significant differences to 35%HP were 6HP% + BioS + 1%TiO₂ and 6HP% + BioS + 2%TiO₂. Analysis of HP decomposition revealed that BioS enhanced HP consumption, and this effect was influenced by the presence of TiO₂. However, this outcome was not affected by time, light irradiation, or TiO₂ concentration. In contrast, photocatalytic activity was influenced by both light irradiation and TiO₂ concentration, with the 6% HP + BioS + 1%TiO₂ formulation exhibiting the highest photocatalytic performance among the tested groups.

Conclusions: BioS increased HP decomposition in the presence of TiO₂, independent of light or TiO₂ concentration. The incorporation of 1% TiO₂ into BioS-enriched bleaching gels enhanced both bleaching efficacy and photocatalytic activity.

<https://doi.org/10.1016/j.dental.2026.03.123>