

## **0027 Bonding of Some Self-etch Adhesives to Unground Enamel**

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**Objectives:** Manufacturers of mild self-etch adhesives such as Clearfil SE Bond (SE: Kuraray) recommend adjunctive phosphoric acid-etching when bonding to unground enamel. Some of the recently introduced self-etch adhesives are more acidic in nature and are claimed to bond well to both enamel and dentin. This study examined the ultrastructure and microtensile bond strengths ( $\mu$ TBS) of two of these more aggressive versions, Xeno III (XE: Dentsply), a 1-step self-etch adhesive, and Simplicity (JK: Apex Dental Materials), a 2-step self-etch adhesive to unground enamel. SE was used as the negative control, and One-Step (OS: Bisco), a total-etch adhesive bonded to 32% phosphoric acid-etched unground enamel was used as the positive control.

**Methods:** The adhesives were applied to unground enamel on the mesial and distal surfaces of extracted human molars, coupled with light-cured composites, and then thermocycled between 5-55°C for 1000X. For TEM, bonded specimens were sectioned without resin-embedding, producing separation of the enamel hybrid layer from the underlying unbonded enamel by a stiffness-toughness mismatch. For bond testing, composite-enamel beams (N=24) were sectioned and tested with a universal testing machine at a crosshead speed of 1 mm/min. **Results:** Enamel hybrid layer thickness ( $\mu$ m): OS ( $9.6 \pm 1.3$ )<sup>A</sup>, JK ( $3.3 \pm 0.5$ )<sup>A,B</sup>, XE ( $1.0 \pm 0.2$ )<sup>B,C</sup>, SE ( $0.3 \pm 0.1$ )<sup>C</sup> [ $P < 0.05$ ]. Dissolution of enamel crystallites on the surface of enamel hybrid layers varied from being barely dissolved (SE) to superficial dissolution (XE; JK) to internal dissolution with central hole regions (JK; OS).  $\mu$ TBS results showed that OS, JK and XE were not significantly different from each other, but were all significantly higher than SE [ $P < 0.001$ ]. There was no correlation between hybrid layer thickness and  $\mu$ TBS.

**Conclusion:** The more aggressive self-etch adhesives exhibit similar bond strength as a total-etch adhesive to unground enamel, making them potentially useful as pit-and-fissure sealants and bonding of orthodontic brackets.

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