Both adhesives were used on etched tooth surfaces in accordance with the instructions for use provided by the manufacturer.

[0093] ExciTE F:

[0094] A layer of the adhesive was applied to the etched tooth surface with a microbrush, massaged in for 10 s with gentle pressure and then aerated with an air blower until an immobile film had formed. The latter was exposed to light with a light-polymerization device (Bluephase Style; Ivoclar Vivadent) for 10 s. A composite plug (Tetric EvoCeram BulkFill; Ivoclar Vivadent) was then grafted as described and the shear bond strength was measured.

[0095] Prime i Bond NT:

[0096] A continuous layer of the adhesive was applied to the etched tooth surface by microbrush. Should the tooth surface no longer glisten wetly after a dwell time of **20***s*, a further layer of adhesive was applied in accordance with the instructions for use. Aeration then took place with an air blower until a continuous, glistening film had formed. The latter was exposed to light with a light-polymerization device (Bluephase Style; Ivoclar Vivadent) for 10 s. Thereafter, as described, a composite plug (Tetric EvoCeram BulkFill; Ivoclar Vivadent) was grafted and the shear bond strength was measured. The results are summarized in Table 3.

TABLE 3

Shear bond strength values on dentin (24 h@37° C.)

		Coefficients of adhesion in MPa (fracture pattern)		
Solution	Adhesive	Wet	Dry	Very dry
EP[1]	Excite F	28.7 ± 2.8 (4/5)	12.9 ± 4.8 (0/5)	8.3 ± 2.2 (0/5)
A	Excite F	31.5 ± 5.2 (5/5)	27.9 ± 5.0 (4/5)	22.5 ± 4.8 (4/5)
B	Excite F	28.7 ± 5.7 (5/5)	25.8 ± 8.8 (3/5)	27.2 ± 13.0 (3/5)
C	Excite F	—	28.8 ± 3.1 (5/5)	—
D	Excite F	—	22.2 ± 8.7 (4/5)	—
E	Excite F	35.8 ± 9.2 (5/5)	31.2 ± 6.0 (5/5)	26.7 ± 5.8 (4/5)
F	Excite F	27.5 ± 6.1 (5/5)	30.4 ± 6.9 (3/5)	—
G	Excite F	23.9 ± 4.4 (5/5)	32.7 ± 4.9 (5/5)	—
H	Excite F	30.6 ± 5.4 (5/5)	—	—
I	Excite F	31.0 ± 5.6 (5/5)	29.8 ± 4.3 (5/5)	—
J	Excite F	22.2 ± 4.4 (5/5)	—	—
K	Excite F	29.6 ± 5.1 (5/5)	—	—
L	Excite F	33.6 ± 5.8 (5/5)	—	—
M	Excite F	32.5 ± 6.7 (5/5)	—	—
N	Excite F	37.9 ± 4.1 (5/5)	—	—
O	Excite F	29.2 ± 7.3 (5/5)	—	—
P	Excite F	28.5 ± 2.0 (5/5)	—	—
Q	Excite F	30.7 ± 9.3 (5/5)	—	—
EP[1]	Prime&	30.7 ± 3.5 (5/5)	9.90 ± 3.4 (0/5)	—
F	Bond NT	33.2 ± 5.7 (5/5)	23.6 ± 3.2 (4/5)	—
I		34.6 ± 5.1 (5/5)	25.5 ± 4.1 (3/5)	—

[1]Email Preparator blue, Ivoclar Vivadent: 37% phosphoric acid (comparison example)

[0097] The data in Table 3 show, for the conditioning agents A-B and E-Q in the case of use on wet dentin, an equivalent effect to the conventional phosphoric acid and adequate adhesion results irrespective of the adhesive. When the dentin was dried more strongly or even over-dried, the coefficients of adhesion of the surfaces treated with phosphoric acid decreased significantly as expected. On the other hand, the conditioning agents A-G and I tested in this regard representatively were influenced little or not at all by the drying process.

Example 3

Determination of Adhesion to Tooth Enamel

[0098] The measurement of adhesion to tooth enamel was carried out analogously to Example 2. Since enamel, as an almost purely inorganic tissue, contains no collagen fibrils the drying time was not varied. Therefore, to test the enamel adhesion, only dry substrate was investigated; after rinsing off of the etching agent the surface was dried for approx. 5 s with a strong stream of air from a dental unit. The aim was to obtain the image of a chalky-white enamel surface which is familiar to a dentist. In order to test the effect of an etching period reduced to 15 s vis-à-vis the established standard of 30 s, both dwell periods were investigated for selected samples. The results for the enamel coefficients of adhesion are given in Table 4.

[0099] The enamel adhesion values shown in Table 4 are, irrespective of the tested adhesive, comparable to the conventional phosphoric acid for the conditioning agents A-Q within accuracy of measurements. Even values appearing lower because of fluctuations in the nature of the tooth substrate are high enough to ensure a clinically adequate bond. Because of the hardness of the substrate, enamel samples always fail adhesively, so that the type of failure (fracture pattern) was not noted here.

TABLE 4

Shear bond strength values on tooth enamel (24 h@37° C.)

Solution	Adhesive	30 s Etching time (MPa)	15 s Etching time (MPa)
EP[1]	Excite F	29.6 ± 4.7	27.2 ± 8.8
A	Excite F	25.8 ± 2.6	30.7 ± 4.6
B	Excite F	24.8 ± 5.8	33.5 ± 6.1
D	Excite F	—	29.2 ± 4.9
E	Excite F	—	28.8 ± 2.5
F	Excite F	—	24.1 ± 6.3