Title	Resin zirconia bonding with two isocyanatosilanes with addition of cross-linker silane
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RESIN ZIRCONIA BONDING WITH ISOCYANATOSILANES AND CROSS-LINKER SILANE

OBJECTIVE: To investigate the effect of two isocyanato silanes and addition of cross-linking silane on the shear bond strength of zirconia.

MATERIALS AND METHODS: 15 specimens of yttria-stabilized-zirconia (Nobel Biocare) were silicatized (Rocatec Soft, 3M ESPE). The pressure was 280kPa, time was 30s/cm^2. 3M ESPE Sil-silane was a control. 0.1 and 1.0 vol.% two silanes, 3-isocyanatopropyltrimethoxysilane (ICMS) and 3-isocyanatopropyltriethoxysilane (ICS) and solutions of 0.1 and 1.0 vol.% of two silanes with 0.05 and 0.5 vol.% cross-linking bis-1,2-(triethoxysilyl) ethane (BTSE) were prepared in 95% ethanol and at pH 4. The primers were applied onto silicatized zirconia and allowed to react for 5 mins. RelyX Unicem resin cement (3M ESPE) was introduced into the cylindrical stub onto the zirconia and light-cured for 40s. All samples were tested at dry condition. The shear bond strength was measured by using a universal testing machine (Instron LTD). One-way analysis of variance (ANOVA) was used for data analysis with the level of significance α=0.05.

RESULT: There was no significantly difference for the mean shear bond strengths for 0.1 and 1.0 vol.% of ICMS and ICS ($p = 0.205$ and $p = 0.952$). There was significant difference between the control group and 0.1 and 1.0 vol.% ICS and ICMS ($p<0.02$). There was significant difference in shear bond strengths for 0.1 vol. and 1.0 vol.% ICMS with addition of cross-linking silane ($p < 0.04$ and $p < 0.01$). There was no significant difference in mean shear bond strength for 0.1 and 1.0 vol.% ICS ($p = 0.642$ and $p = 0.562$) with cross-linking silane added. There was no significant difference between the control group and 0.1 and 1.0 vol.% ICMS with cross-linking silane added ($p=0.76$)

Silane	Silane concentration / vol.%	Cross-linking silane concentration / vol.%	Mean shear bond strength / MPa ± SD
3M ESPE Sil-silane	< 3.0	0	8.76±1.40
	0.1	0	6.78 ± 3.21
ICS	0.1	0.05	5.97 ± 1.88
	1.0	0	6.64 ± 2.19
	1.0	0.5	7.21 ± 3.11
	0.1	0	7.41 ± 1.67
ICMS	0.1	0.05	9.52 ± 2.56
	1.0	0	6.59 ± 2.58
	1.0	0.5	9.21 ± 3.94

CONCLUSION: Addition of cross-linking silane may enhance the shear bond strength between silica-coated zirconia and resin cement.