

## 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 silicized (Rocatec Soft, 3M ESPE). The pressure was 280kPa, time was 30s/cm<sup>2</sup>. 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 silicized 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  $\alpha=0.05$ .

**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 $\pm$ SD
3M ESPE Sil-silane	< 3.0	0	8.76 $\pm$ 1.40
	0.1	0	6.78 $\pm$ 3.21
ICS	0.1	0.05	5.97 $\pm$ 1.88
	1.0	0	6.64 $\pm$ 2.19
	1.0	0.5	7.21 $\pm$ 3.11
	0.1	0	7.41 $\pm$ 1.67
ICMS	0.1	0.05	9.52 $\pm$ 2.56
	1.0	0	6.59 $\pm$ 2.58
	1.0	0.5	9.21 $\pm$ 3.94

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