

# The bond strength of the resin-to-zirconia interface using different bonding concepts.

[Behr M](#), [Proff P](#), [Kolbeck C](#), [Langrieger S](#), [Kunze J](#), [Handel G](#), [Rosentritt M](#).

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Department of Prosthetic Dentistry, Regensburg University Medical Center, Regensburg, Germany. michael.behr@klinik.uni-regensburg.de

## Abstract

### **OBJECTIVES:**

This study investigated the shear bond strength (SBS) and the tensile bond strength (TBS) of the zirconia-to-resin interface using different cement bonding concepts.

### **METHODS:**

Coplanar zirconia specimens were bonded to CoCr-cylinders measuring 5 mm in diameter and 3 mm in height. All bonding areas were first sandblasted with 110  $\mu\text{m}$  Al(2)O(3) (0.28 MPa, 10 s). SBS and TBS were determined after 24 h and 90 d of water storage as well as after 12,000 thermal cycles (TC, 5°/55 °C, 17 d). The bonding concepts consisted of the application of a silane coupling agent, tribological silica coating (Rocatec system), cements or primers containing phosphone, mono-phosphate, or di-phosphate, and a combination of silica coating and primer.

### **RESULTS:**

Bond strength higher than 10 MPa was considered clinically sufficient. SBS measured with each bonding concept surpassed this value, except control and MaxCem after 90 d. In contrast, TBS values were rather different. The application of a silane coupling agent alone showed very low values in the TBS test. Silica coating was only sufficient after 90 d of water storage and when combined with phosphate-esters or phosphone-containing primers. Bonding agents based on di-phosphates or phosphones showed stable TBS values of less than 10 MPa under different aging conditions. The predominant mode of failure was adhesive failure at the ceramic surface.

### **CONCLUSIONS:**

None of the investigated bonding concepts of the zirconia-to-resin interface provided clinically sufficient tensile bond strength. SBS values were inadequate for a sufficient ranking.

