

**Evaluation of the Effect of Intermediate  
Agents on the Shear Bond Strength of  
Repaired Aged Silorane Resin Composite**

(In vitro study)

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## *Abstract*

A silorane based resin composite, **Filtek™ P90** restorative, has been introduced to overcome the polymerization shrinkage of the methacrylate based resin composite. The repair of resin composite may hold clinical advantages. Currently, there is little information regarding the repair potential of silorane resin composite with either silorane or methacrylate based resin composite. This in vitro study was performed to evaluate the influence of the intermediate agents on the repair shear bond strength of aged silorane resin composite (**Filtek™ P90,3M ESPE**) that repaired using either silorane (**Filtek™ P90**) or methacrylate (**Filtek™ Z250, 3M ESPE**) based resin composite.

A total number of eighty silorane resin composite samples were prepared by filling silorane composite (**Filtek™ P90**) shade A2 (3M ESPE ) into a retentive cavities (6 mm in diameter and 2 mm in depth) of acrylic mold. Composite resin specimens were polymerized for 20 seconds (according to manufacturer's instructions) by using LED curing light (1200 Mw/ cm<sup>2</sup>) under celluloid strip and glass slide. All samples were aged by storage for one week in a distilled water at 37°C. After aging, wet finishing of all specimens with medium (violet) super-snap disks (SHOFO INC.higashiyama-ku,Japan) were performed, the aged specimens were divided into the following groups (each group ten samples) according to repair materials:

**Group A (Control):** Repaired with silorane based composite (SBC) (**Filtek™ P90**) without intermediate agents.

**Group B:** Repaired with **P90 System Adhesive (3M ESPE)** and SBC (**Filtek™ P90**).

**Group C:** Repaired with **Adper Scotchbond Multipurpose adhesive system (3M ESPE)** and SBC (**Filtek™ P90**).

**Group D:** Repaired with **Clearfil™ Repair kit (Kuraray)** and SBC (**Filtek™ P90**).

**Group E (Control):** Repaired with methacrylate based composite (MBC) (**Filtek™ Z250**) without intermediate agents.

**Group F:** Repaired with **P90 System Adhesive (3M ESPE)** and MBC (**Filtek™ Z250**).

**Group G:** Repaired with **Adper Scotchbond Multipurpose Adhesive system (3M ESPE)** and MBC (**Filtek™ Z250**).

**Group H:** Repaired with **Clearfil™ Repair kit (Kuraray)** and MBC (**Filtek™ Z250**).

After intermediate agents application, composite of repair (**Filtek P90 shade C2 (3M ESPE)** ) used for forty samples, **Filtek Z250 shade C2 (3M ESPE)** ) used for forty samples) applied and cured in two increment using clear translucent plastic mold 3.5 mm diameter and 4 mm height. After storage for 24 hour at 37°C in a distilled water, shear bond strength testing was performed using a universal testing machine (shear bond strength) with crosshead speed of 0.5mm/min. Fracture surfaces were examined using a light microscopy (40X) to determine failure mode. Data were analyzed statistically by One-Way ANOVA and Least Significant Difference (LSD) test. The results showed a highly significant difference between all groups when compared to two control groups (**P<0.001**), also there was a highly significant difference (**P<0.001**) between the groups which repaired with **P90 System Adhesive** as intermediate agent (IA) when compared to groups that repaired with **Adper Scotchbond Multipurpose adhesive system** as IA, also there was a highly significant difference between the groups which repaired with **Clearfil™ Repair kit** as IA in comparison with the groups that repaired with **Adper Scotchbond Multipurpose adhesive system** as IA.

In conclusion, the methacrylate resin composite was not compatible with silorane resin composite without intermediate agents. The use of the intermediate agents enhanced the shear bond strength of silorane based composite significantly. The **Clearfil™ Repair kit** (silane based adhesive) and **P90 System Adhesive** (phosphate based adhesive system) were the most effective intermediate agents for

the repair of silorane restoration with both SBC and MBC repair materials. The use of **Adper Scotchbond Multipurpose adhesive system** resulted in a lower SBS than the other adhesive systems which is considered clinically inadequate.