



Bonding

[Video](#)

Bonding is an informal term used in dentistry to denote the process of glueing ceramic or plastic fillings or inlays.

Unlike cementing, the surfaces to be glued are specially treated. The following describes the individual steps.

Step one - etching the surfaces and teeth: etching the surface of a tooth or ceramic inlay makes it rough - we call this a micro-retentive pattern - the animation shows a partial cross-section of a tooth (in white), to which etching gel is applied (in blue). At first, the surface of the tooth is smooth, but then the gel "eats" its way into the enamel of the tooth, making little pools and holes. These formations remain, even after the etching gel is washed away. The initial surface of the tooth along with the inlay equals a length of X. After etching, the glueing surface increases by a factor of Y. And since the etching pattern is not only two-dimensional, but also three-dimensional, this further increases the glueing surface.

Note that not all parts of the tooth can be etched to the same extent. The animation shows a tooth from which enamel is removed using a drill.

Enamel is a mineral. Below this there is dentine, which consists of protein strands and small channels. These structures are destroyed in drilling and form a pulp, called a smear layer (shown in the animation as a gray mass).

The smear layer keeps the glue from seeping in - but if the enamel and dentine are exposed to etching gel for a long time, then the dentine proteins released would form clumps - a process called denaturisation. As with of chicken soup which begins to boil, a gray film forms on the surface - in this case consisting of denaturated proteins. The glue cannot seep into the dentine. This is why the etching gel is applied to the enamel first, and then to the dentine a little while later and is only left there for a few seconds. This not only removes the smear layer, but also creates the desired micro-retentive pattern. Now the glue (shown in green) can flow in freely, which is crucial for bonding.

Step two - the primer; the primer (shown here in violet) helps to remove water from the dentine, so that the protein strands "dry out", because water prevents glue from flowing in.

Step three - the adhesive; the protein strands are now dry, but they have collapsed. The adhesive makes them stand up again, which enables a better distribution of the glue .

Step four - bonding; the bonder is the "pre-glue", and it is very thin, which means it can flow very easily around the clean protein strands of the dentine and the vacuoles and holes of the enamel.

Finally, the glue is applied. Although this is only a rough outline of all the steps of the process, it is apparent that glueing tooth fillings is a complicated process. Good results can only be achieved if the manufacturer's specifications are followed, and the tooth must remain clean throughout the process. This is why it is always best to use a coffer dam. The animation shows what happens when for example saliva or blood (shown here in red) comes into contact with the tooth - the porous surface closes up and the glue (shown in green) can no longer flow into the structures formed. The fillings or inlays do not adhere as well and are not as tightly sealed. Good ceramic inlays should not be apparent as such, not even to a dentist!