Contrary to popular belief, bonding to zirconia is achievable. The process for bonding to zirconia is the same as for other surfaces:
- creating mechanical retention
- achieving chemical interaction by surface priming

The method differs based upon the substrate of the surface being bonded to. With more knowledge about zirconia, methods of bonding become clear.

**Key Facts About Zirconia**

Zirconia is NOT a metal, it is a non-etchable ceramic. This is important to know because research has established the following:
- Zirconia is a non-etchable ceramic, so hydrofluoric acid will not work.
- Zirconia does not contain silica, so silane primers are ineffective.

So what is the process for bonding?

Before you begin, consider the retention of your preparation. A short preparation will require a bonding procedure on the dental preparation with a bonding agent (All-Bond Universal), an adhesive resin cement (Duo-Link Universal), and an MDP-containing primer (Z-PRIME Plus). If the retention is ideal, you can use a self-adhesive resin cement (TheraCem, which also contains MDP) and an MDP-containing primer.
Research has shown that chemical bonding to zirconia is achievable.

A study published in the *American Journal of Dentistry* demonstrated that the **MDP monomer has been proven to form chemical bonds to zirconia**. It is a functional monomer that has a great affinity for metal and zirconia.

Another important aspect of zirconia is that saliva interacts with it. Saliva phosphates and zirconia form ionic bonds, depleting the number of available bonding sites on the zirconia surface.

Simply rinsing the zirconia restoration with water, ethanol, or acetone will not work. In order to neutralize the phosphate contamination, the zirconia surface must be cleaned with an alkaline solution (such as ZirClean).

References
To optimize bonding to zirconia, you will need both mechanical retention and chemical interaction.

**Mechanical Retention: Sandblast**

Sandblasting zirconia with alumina creates surface texture to improve bonding.

**Achieving Chemical Bond: MDP**

Products that contain the MDP monomer will bond to zirconia.

TheraCem, formulated with MDP, allows chemical bonding strength to zirconia restorations without the need for a primer.

Applying an MDP-containing primer such as Z-PRIME Plus will achieve a chemical bond to a zirconia restoration.

*All images courtesy of Dr. Nathanial Lawson.*
You will also need to clean the surface after try-in to remove phosphate contamination from saliva.

**ZirClean** is a cleaning gel designed for the non-abrasive cleaning of the bonding surfaces of zirconia (and other prosthetic restorations) after intraoral try-in. This product offers improved ease-of-use and helps achieve reliable adhesive cementation results.*

*As compared to untreated samples. Data on file.
To achieve an optimal and reliable bond to zirconia, the substrate must be accordingly sandblasted and an MDP-containing primer should be applied. Saliva reacts with zirconia and only an alkaline surface cleaner can remove the contamination, resulting in an optimal bond surface. These protocols demonstrate that cementation to zirconia can be both simple and reliable.

<table>
<thead>
<tr>
<th>Protocol 1</th>
<th>Protocol 2</th>
<th>Protocol 3</th>
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</thead>
<tbody>
<tr>
<td>• Restoration is sandblasted by the laboratory</td>
<td>• Restoration is sandblasted by the laboratory</td>
<td>• Restoration is not sandblasted</td>
</tr>
<tr>
<td>• Prime the restoration immediately upon receiving using Z-PRIME Plus</td>
<td>• Try-in the restoration</td>
<td>• Try-in the restoration</td>
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<tr>
<td>• Try-in the primer treated restoration</td>
<td>• Decontaminate the surface with ZirClean</td>
<td>• Sandblast restoration according to manufacturer’s instructions</td>
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<tr>
<td>• Rinse</td>
<td>• Rinse thoroughly with water and air dry with oil-free air</td>
<td>• Decontaminate the surface with ZirClean</td>
</tr>
<tr>
<td>• Proceed with cementation</td>
<td>• Prime with Z-PRIME Plus</td>
<td>• Rinse thoroughly with water spray and air dry with oil-free air</td>
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<tr>
<td></td>
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</table>

Note: Priming before try-in will protect the restoration from saliva contamination.
The ABCs of Zirconia Bonding

Non-retentive preparations:
- Glass Ceramics/ Porcelain (silica-based) or Lithium Disilicate/Silicate
- Metal, Zirconia, Alumina, Composite

Retentive preparations:
- Glass Ceramics/ Porcelain (silica-based) or Lithium Disilicate/Silicate
- Zirconia, Metal, Alumina, Composite

For more resources, check out our comprehensive guide.
BISCO strives to inspire better dentistry worldwide by developing best-in-class dental products, educating and sharing our knowledge and research with the dental community, and supporting our customers’ needs as their go-to restorative dental experts.

Our goal is to make our customers’ lives easier by helping dentists perform their best dentistry. We place tremendous value on offering award-winning products that provide reliable solutions for every clinical need.

BISCO’s dedicated team of customer support, clinicians, and scientists go above and beyond to help dental professionals understand product chemistries and answer questions on the materials they use in their operatories. Our team of experts have you covered! Call and speak to an expert or use our online tool to answer your questions at https://www.bisco.com/ask-the-experts/.
The zirconia surface must be cleaned with an alkaline solution to help achieve reliable cementation results. Find out why!

Bonding to zirconia only requires two very simple steps: micromechanical retention and chemical bond. You can achieve both in your office!

Drs. Gary Alex, Markus Blatz, and Nathaniel Lawson discuss indications and techniques for bonding zirconia restorations at the Inside Dentistry Roundtable.