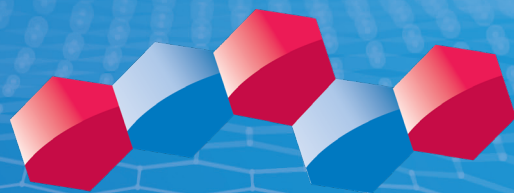
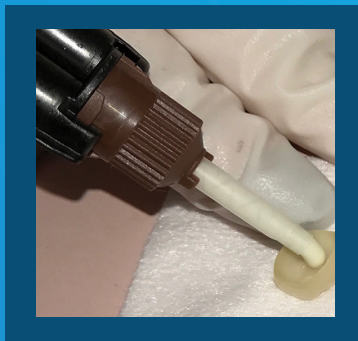


Understanding Cements

A Guide From Prep to Post-Op



BISCO

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Introduction

Where to begin?

The cementation process can often seem daunting as there are so many cements to choose from, and multiple factors play a part in the process including procedure, restoration type, material preference, and time. Which cement to choose? Which primers should be applied? What about cementing zirconia crowns?

At BISCO, we receive many questions in regards to cement selection, technique, and procedure, so we have condensed this information into the following guide to help you along. This guide is divided into 4 sections:

1. Prep
2. Cement Selection
3. Procedure
4. Post-Op

Page 11 of this ebook contains a [chart](#) of BISCO products to help streamline your cement selection process. Without further ado, let's dive in!



Section 1: Prep

Treating the surface of your indirect restorations

Treating the surfaces of your restorations is the first step to obtaining lasting results in your cementation process. Making sure the surfaces are decontaminated and primed with the appropriate primer will ensure a stronger bond between the restoration and the tooth, and reduce bond failure.

It is important to decontaminate your crowns after try-in.

Phosphate contaminants from saliva can weaken bond strengths, and removing these will result in a better long-term restoration. If the crown has been sandblasted, then after try-in clean the internal surface with a product like [ZirClean®](#) and then proceed with priming to the bonded surface with a suitable primer. If the surface wasn't sandblasted, then the intaglio surface should be sandblasted, and a primer can then be applied.



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.

Product Highlights

- Delivery system offers improved ease-of-use
- Easy placement and clean-up
- Helps achieve reliable adhesive cementation results*
- Contaminants such as saliva can be removed to help achieve better bond strength after try-in*

*As compared to untreated samples. Data on file.

Priming

Next, the surfaces need to be primed. The correct priming procedure is dependent upon the substrate to be cemented.

For *glass ceramics such as porcelain or lithium disilicate* (e.g. IPS eMax®*), first clean the restoration and then etch with hydrofluoric acid.

To prime the surface, use a Silane solution, such as [Bis-Silane™](#) (a two-part silane coupling agent) or [Porcelain Primer](#) (a single-component, pre-hydrolyzed, no-mix silane primer). Silane solutions are designed to improve bonding between porcelain substrates and resin cements.

If your indirect restoration is *zirconia-based, metal, or alumina*, then an MDP-containing primer should be used.

BISCO offers [Z-Prime Plus™](#), which is designed specifically for increased bonds to zirconia; the unique combination of two active monomers, MDP and BPDPM, is what gives Z-Prime Plus a synergistic effect resulting in high bond strengths**. Decontaminate the restoration, sandblast, and then apply the primer.

Click here to watch a webinar on zirconia bonding!



* IPS e.max is a registered trademark of Ivoclar Vivadent, Inc.

** Data on file. BISCO, Inc.



Z-Prime Plus Spotlight

Z-Prime Plus is BISCO's dedicated zirconia primer.

Z-Prime Plus includes the following features:

- Significantly enhances bond strength to zirconia, alumina, and metal substrates*
- Compatible with light-cured and dual-cured resin luting cements
- Single bottle delivery system offers ease of dispensing

*Data on file, BISCO, Inc.

Watch the video to learn more!

BISCO Bite: Bonding to Zirconia

Preparing the surface of the tooth

Next, remove the temporaries and begin to prep the teeth for cementation.

Ensure all subgingival bleeding has stopped.

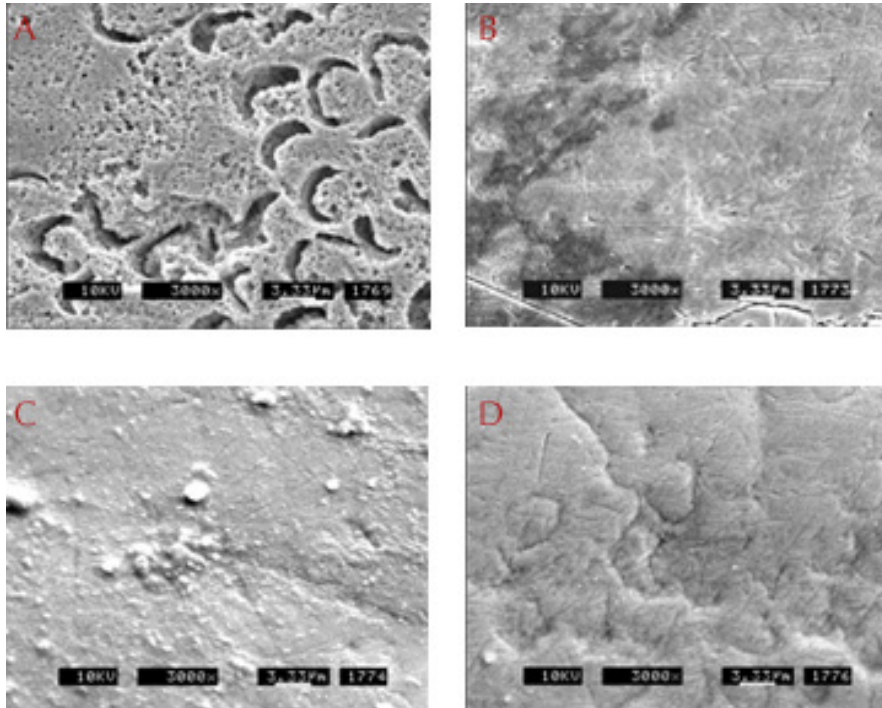
If the subgingival area of the preparation continues to bleed after applying an astringent, consider packing retraction cord in the area, placing a wedge to compress the bleeding tissues, or cauterizing the area prior to proceeding with cementation.

Certain cements may also require an adhesive to be used on the tooth. It is recommended that if the surface is non-retentive that adhesive be used to ensure a strong bond between the tooth and the restoration. Follow manufacturer instructions for applying adhesive to the tooth.

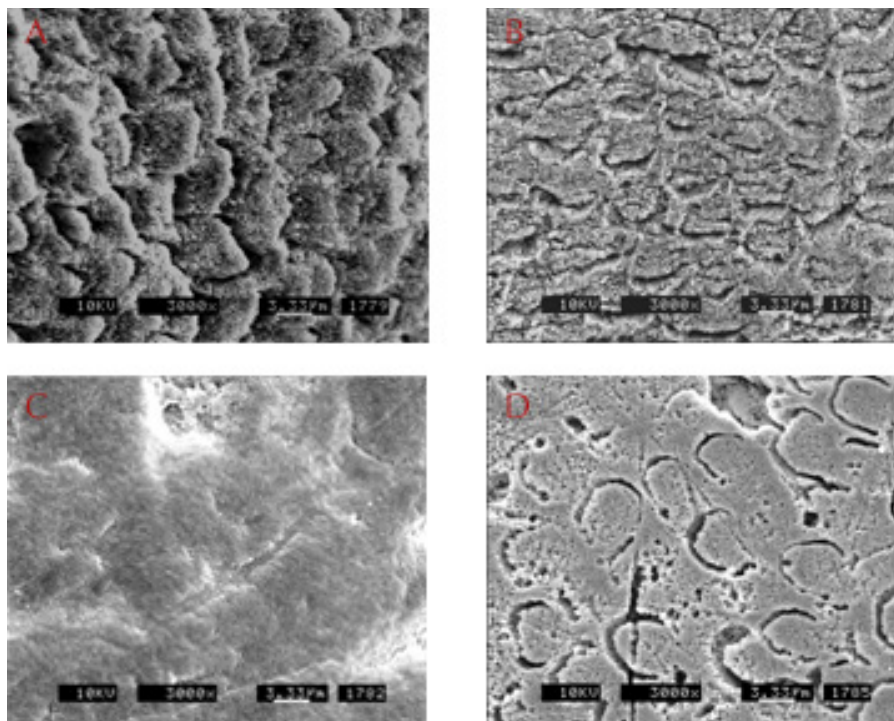
If you are using a self-etch adhesive and need to etch enamel, please note that mildly acidic SE adhesives (pH > 2.0) do not effectively etch cut or uncut enamel, and, therefore, the enamel should be etched using the selective etch technique.



Photo courtesy of Dr. Nash



SEM comparing the etching patterns on uncut enamel by three one (single)-step self-etching adhesives: (A) 32% phosphoric acid (15 seconds) as control. (B) Adper™ Prompt™ L-Pop™ (15 seconds). (C) AQ Bond (20 seconds). (D) iBond® (30 seconds).



SEM comparing the etching patterns on cut enamel by three one (single)-step self-etching adhesives: (A) 32% phosphoric acid (15 seconds) as control. (B) Adper™ Prompt™ L-Pop™ (15 seconds). (C) AQ Bond (20 seconds). (D) iBond® (30 seconds).

Section 2: Choosing Your Cement

Finding the right product for the job

Dental cements come in a variety of formulas and have a wide range of applications. Factors that may play a role in choosing a cement include restoration type, substrate, procedure, aesthetics, and the retentiveness of the prepared tooth.

Cement Quick Start Guide

Restoration

Cement

Zirconia/Alumina (BruxZir, Lava)	Crown & Bridge	TheraCem® Duo-Link Universal™
Porcelain/Feldspathic/Pressed	Crown & Bridge/Inlay/Onlay	TheraCem Duo-Link Universal
	Veneer	Choice™ 2 eCEMENT® L/C
Lithium Disilicate (e.Max)	Crown & Bridge/Inlay/Onlay	eCEMENT D/C Duo-Link Universal TheraCem
	Veneer	eCEMENT L/C Choice 2
Metal/PFM	Crown & Bridge	TheraCem Duo-Link Universal
	Maryland Bridge	Duo-Link Universal
Composite Reinforced	Crown & Bridge/Inlay/Onlay	TheraCem Duo-Link Universal
	Veneer	Choice 2

Veneers

When placing thin veneers, light-cured resin cement is preferable because it allows for longer working time, does not need to be mixed, has shorter finishing time, increased color stability, and longer shelf life. The substrate of the veneer will also determine your cement choice.



For *lithium disilicate veneers*, BISCO recommends using a product such as [eCEMENT® L/C](#) which has a low film thickness, comes in multiple shades for superior esthetic, and provides easy removal of excess cement.



If you are placing *porcelain veneers*, using a cement such as [Choice™ 2](#) is advisable because of the exhibited color stability which is critical in esthetic veneer cases. A resin cement that is highly filled will enhance the overall strength of the restoration, which is important for withstanding daily pressure that veneers will suffer.



Photos courtesy of Dr. Tyler Lasseigne, DDS, CDT

Crown and Bridge

The available retention of the tooth preparation is a critical factor in choosing the type of cement when it comes to placing crowns and bridges.

If you are placing *zirconia or alumina crowns* and your tooth prep is short or non-retentive, then BISCO recommends using an adhesive procedure on the tooth in combination with a cement that has a high degree of conversion in both light-cure and self-cure modes, such as [Duo-Link Universal™](#).

If the prep provides more retention than a self-adhesive, dual-cured resin cement such as [TheraCem®](#) is recommended. TheraCem® comes with the added benefit of continuous calcium and fluoride release¹ and also transitions from acidic to alkaline pH² in minutes, both of which aid in healing of the tooth.

“Great products. Makes various procedures easier and long lasting. Been using them for many years. Highly recommend.”

-Dr. Rick Bernstein

For crowns made of *lithium disilicate*, BISCO recommends using [eCEMENT® Dual-Cured](#). eCEMENT luting cement is specifically formulated to meet the requirements for bonding to lithium disilicate, and is available in varying thicknesses and opacities to mask defects and restore esthetics.

[TheraCem](#) and [Duo-Link Universal](#) also provide strong bonds to lithium disilicate; if bonding to a more retentive surface, then TheraCem is recommended, but if bonding to a less retentive surface then BISCO recommends using Duo-Link Universal.

For crowns made of *porcelain or feldspathic*, BISCO suggests using [TheraCem](#) or [Duo-Link Universal](#).

1. Gleave CM, Chen L, Suh BI. Calcium & fluoride recharge of resin cements. Dent Mater. 2016 (32S):e26.
2. New Self-adhesive Resin Cement With Alkaline pH. Chen L, Gleave C, Suh B, J Dent Res96(A):#286, 2017.

TheraCem Spotlight



TheraCem is BISCO's newest self-etching, self-adhesive cement.

TheraCem includes the following features:

- Fluoride and calcium release¹
- Delivers a strong bond to zirconia and most substrates
- 18-month shelf life at room temperature (BisCem requires refrigeration)
- Higher radiopacity and can be easily identified on a radiograph
- Easy clean-up and removal of excess cement
- Alkaline pH after bonding²

1. Gleave CM, Chen L, Suh BI. Calcium & fluoride recharge of resin cements. Dent Mater. 2016 (32S):e26.

2. New Self-adhesive Resin Cement With Alkaline pH. Chen L, Gleave C, Suh B, J Dent Res96(A):#286, 2017.

Watch to learn more about TheraCem!

Inlay/Onlay

Inlays/onlays that are made of *lithium disilicate* should use [eCEMENT](#) d/c, [Duo-Link Universal](#), or [TheraCem](#).

If the inlay/onlay is *porcelain*, then [TheraCem](#) or [Duo-Link Universal](#) is recommended.

For a *composite reinforced* inlay/onlay, [TheraCem](#) or [Duo-Link Universal](#) may be used.

Duo-Link Universal Spotlight

[Duo-Link Universal](#) is compatible with all dental materials, and formulated for cementation of all* indirect restorations.

- Formulated to allow for quick and easy removal of excess cement
- High degree of conversion in both light- and self-cured modes ensures a strong, long lasting restoration
- Easily identifiable on radiographs
- Ideal for all CAD/CAM restorations
- Low film thickness ensures complete seating of the restoration
- Available in two esthetic shades, Universal and Milky White



*It is recommended to use Choice™ 2 for veneer cementation

Section 3: Cementing Procedures

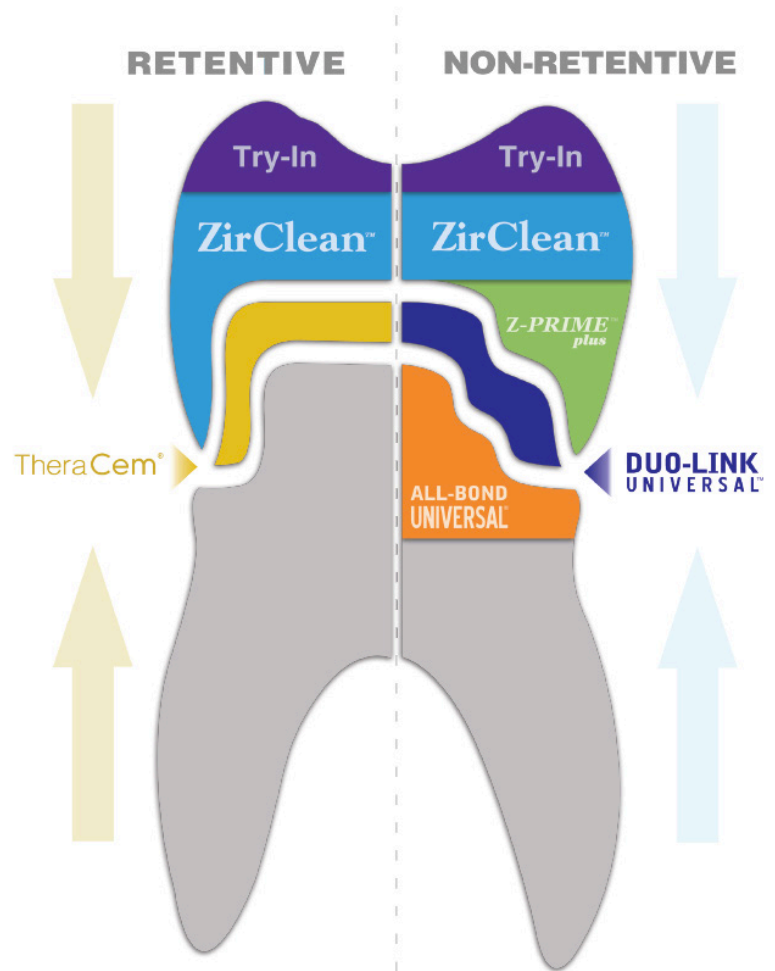
Let's proceed

Now that a cement has been chosen, it is time to proceed with cementation.

Just as the substrates used in your indirect restoration play a role in determining cement selection, the same holds true when considering your approach to the cementation procedure. See page 11 of this ebook for a cement selection [Quick Guide](#).

Also keep in mind that the available retention area of the tooth can affect procedure: for non-retentive preps, make sure to apply adhesive to the tooth before cementing, and if there is more retention then a self-adhesive cement will be effective.

Recommended Clinical Procedure for Zirconia Bonding



IPS e.max

Since IPS e.max®* lithium disilicate is a silica-based ceramic, *hydrofluoric etching followed by silane* is the recommended treatment. The procedure is as follows:

1. Try-in restoration.
2. Etch the internal surface of the restoration with 4-5% hydrofluoric etchant for 20-25 seconds. Rinse with water and dry.
3. Treat the internal surface of the restoration with silane primer: 1 coat, 1 minute, air dry. (*Note: only pure silane primer should be used, such as BISCO [Porcelain Primer](#) or [Bis-Silane](#). Silane-containing adhesives are not effective.*)
4. If bonding to enamel, etch the enamel with phosphoric acid etchant, rinse with water.
5. Apply dental adhesive to the tooth, air dry, light cure for 10-20 seconds. (*Note: always treat the restoration first, then treat the tooth structure.*)
6. Apply dual-cure resin cement. If placing a veneer, apply a light-cured veneer cement to ensure shade-shifting doesn't occur.
7. Remove excess cement.



* IPS e.max is a registered trademark of Ivoclar Vivadent, Inc.

Zirconia

Zirconia continues to grow in popularity, and as more and more dentists start to use this substrate in their office it's important that the correct procedure is followed so there are no bond failures.

1. Try in zirconia.
2. Decontaminate the restoration to remove saliva phosphates, which can cause your restoration to de-bond. (BISCO now has a restoration cleaner called [ZirClean](#) which can be used on zirconia, ceramic, and metal restorations.)
3. If the lab hasn't done so ahead of time, sandblast the intaglio surface of the restoration.
4. Treat the internal surface of zirconia with an MDP-containing primer (such as [Z-Prime Plus](#)).
5. Apply dental adhesive to the tooth, air dry, light cure for 10-20 seconds.
6. Apply a resin cement.
7. Clean-up the excess.



Photos courtesy of Dr. Nash.

Zirconia Bonding Checklist

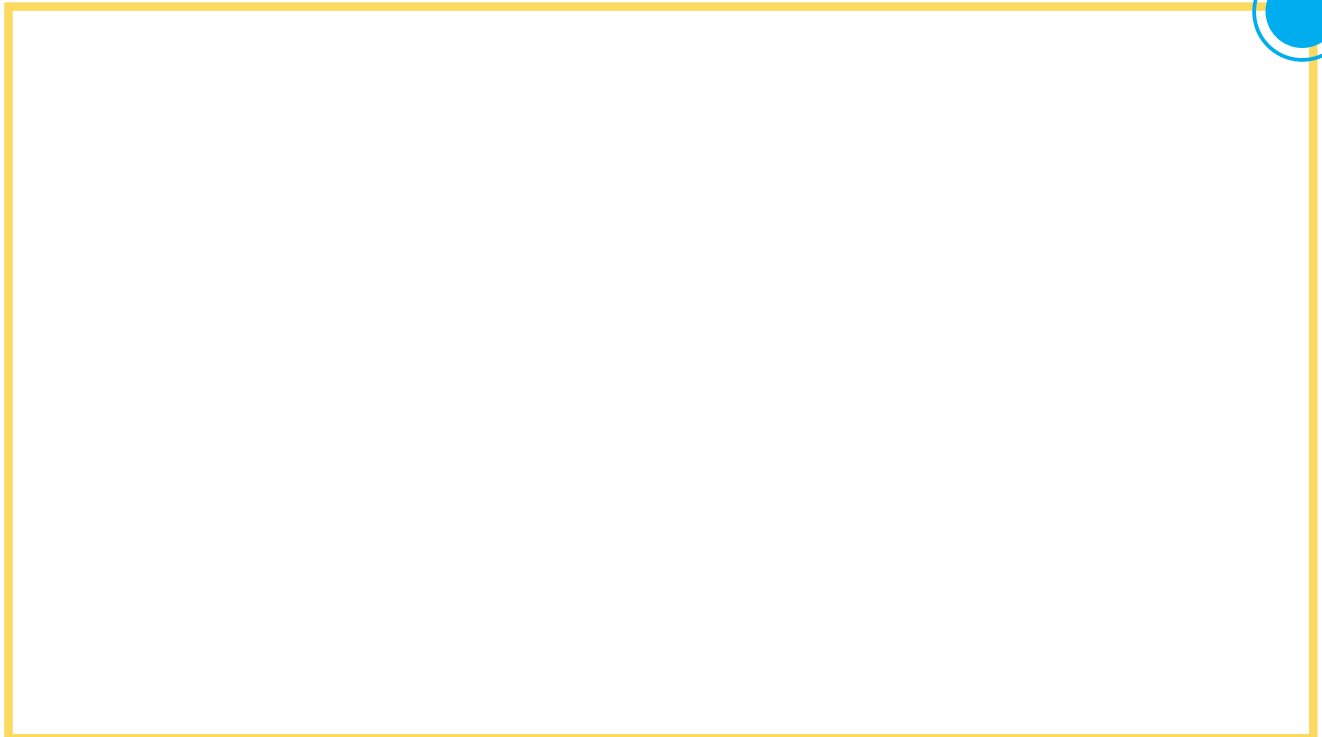
- TRY-IN
- DECONTAMINATE
- SANDBLAST
- MDP PRIMER
- RESIN CEMENT

Metal-Ceramic

In cases where you choose to use metal-ceramic restorations, the following procedure is recommended.

1. Sandblast the internal surface, rinse, dry.
2. Apply one coat of an MDP containing primer ([Z-Prime Plus](#)), air dry.
3. Etch the tooth with phosphoric acid etchant, rinse.
4. Apply adhesive, air dry, light cure.
5. Proceed with using a dual-cure resin cement.

Watch the video to see a PFM case



Section 4: Post-Op

You've done it!

The hard part is over! Or is it?

Here are some tips to keep in mind to ensure that the restorations will look good in your patient's mouth and last for a long time.



Courtesy of Dr. Kim

Removing residual cement

If you are having trouble removing the residual cement from open margins, then you may have to use a finishing bur at the margin, careful not to create a new void. Please keep in mind that cements are not intended to fill significant marginal gaps.

If you have closed margins and are having difficulty, then use a scaler and push the cement towards the gingiva to break it away from the restoration. Interproximal cement can be removed with a similar technique, pushing the cement away from the margin.

Remember to dislodge any loosened fragments.

Make sure floss can pass through

If the contact between the restoration and the adjacent tooth have accidentally become bonded together and thin PTFE-based floss cannot pass through, then use an end-cutting saw and carefully break the thin cement filling the contact. You will want to *avoid* using a diamond strip, which may open up the contact.

To avoid this happening in the future, be careful not to get etchant or self-etch adhesive onto adjacent tooth surfaces. If this is unavoidable, then using PTFE-based tape to protect the surrounding surfaces may prevent this from happening.

Avoiding bond failure with self-adhesive resin-based cements

First, consider the retention available on your prep and that you used the correct cement selection during your procedure. If that was all taken into account, then consider using a self-etch adhesive on the entire preparation prior to recementing; using a bonding agent will help enhance the adhesion of any resin cement.

Preventing marginal discoloration

If you've experienced marginal discoloration when using ceramic restorations, consider the soft-tissue astringent you are using. Iron-based chemical astringent can cause margins to turn dark or black. Instead, try an aluminum-based astringent and make sure there is no blood contamination prior to cementing.

Conclusion

As new dental materials come onto the market, it's important to keep up to date with information so that every cementation procedure is successful. Cements, primers, adhesives and etchants, along with substrate types, all have a role to play and can have an effect on the final outcome. Remember, if you ever have any questions in regards to materials and recommended procedures, you can reach out to us at our [Ask the Experts](#) page or phone our Sales Professionals at 1-800-247-3368.

Ask the Experts



About the Experts
Dr. Suh

Dr. Byoung Suh is the Founder and President of Bisco Dental Products, Inc. which is located in Schaumburg, Illinois. With his background in research and chemistry, his focus at Bisco is on dental materials research and product development. He has over 30 patents and 19 patents pending, and has published more than 30 articles and 80 abstracts. Dr. Suh has become a well-known and sought-after lecturer and teacher lecturing extensively in the US and Canada, as well as in over 40 countries internationally. He has given more than 250 lectures and presentations at various dental associations and research conventions around the world.

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Top Questions

1. "Hydrophilic vs. Hydrophobic Adhesives"?
2. What are MMPs and how do I inhibit them?
3. What is the difference between TheraCal LC and Calcium Hydroxide?
4. What is the difference between TheraCal LC and MTA materials?

Other Experts

- Dr. Byoung Suh
- Dr. Rolando Nuñez
- Liang Chen, Ph.D

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and we will respond shortly

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Recent Questions

1. Can TheraCal LC be used in pediatric cases for either direct or indirect pulp capping?
2. Do I need to decontaminate my zirconia crown after try-in?
3. Why are the margins of my all ceramic restorations turning dark or black sometime after cementation?
4. The bond of my self-adhesive resin-based cement is failing after a few years, what can I do?

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