

Cubic Zirconium...for Your Teeth?

It may surprise you, but cubic zirconium (or faux diamonds) aren't just for your fingers anymore.

They're also for your teeth.

Cubic zirconium (CZ) is formed when white zirconium dioxide is heated to very high temperatures. Cubic zirconium is extremely rare in nature, but it can be synthesized to a very hard, optically flawless, and colorless gemstone. These properties also make the material very useful in dentistry.

Understanding porcelain

Porcelain or ceramic materials have revolutionized the field of cosmetic dentistry over the past several decades. Prior to the advent of porcelains, dental fillings were routinely made of either gold or silver—not very cosmetic by today's standards. Porcelain, however, has optical properties that closely replicate the natural structures of the teeth, enamel, and dentin. The problem with porcelain, though, is that like any glass, it is quite brittle; many dental restorations would not be able to endure the stresses of chewing and grinding.

To overcome this problem of weakness, dental porcelains have routinely been “baked” onto a rigid metal core or frame. In doing so, many of the desirable cosmetic properties of porcelain are diminished.

Dental enamel is a very translucent material, and as light passes through it, it is reflected off of the dentin and back through the enamel, which produces the color that we see. Just as important, the light is transmitted into the root of the tooth, much like a fiber-optic cable. As the light passes into the root, it then reflects into the surrounding gum tissue, allowing for the pink of the gingiva to be illuminated.

The role of cubic zirconia

Porcelain is also a very translucent material, but because the porcelain is only the cosmetic covering to a metal core, the natural and desirable optical properties seen in teeth are not replicated. This often leads to crowns in which the color is not very lifelike, which are often referred to as being opaque. In addition, the blockage of light into the root causes the gum tissue to look dark and gray.

This is where zirconium dioxide becomes very relevant. When it is heated and stabilizing agents are added, the strength properties can equal or exceed that of metal. Therefore, zirconia has been developed to replace the metal in crowns and bridges. And because the material is white and transmits light, the optical pitfalls of metal can be overcome.

The role of gum tissue in appearance

In cosmetic dentistry, the appearance of the gum tissue can be just as important as the appearance of the teeth in a beautiful smile. (I recently devoted an entire column in QUINTESSENTIAL BARRINGTON to this topic). All too often I see people who have metal-based porcelain crowns and bridges, and it is quite obvious. Many times the illusion of reality has not been maintained in these cases because the gum tissue appears dark and not in symmetry to the adjacent teeth. Zirconia crowns avoid this pitfall, as the natural phenomenon of light transmitted through the root and into the gingiva is not disturbed as it is in metal crowns.

Understanding porcelain

So who would have guessed that the same cubic zirconium sold in jewelry stores would be even more useful in your mouth? After all, people look at your smile long before they look at your fingers. And while this mineral may be a “faux diamond,” it's the real thing when it comes to producing a beautiful smile. 

PHOTO: THOMAS BALSAMO



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