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JPD DIGITAL - VIDEO ARTICLE

CAD-CAM ceramic material options for discolored teeth

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SUMMARY

With the recent advances in computer-aided design and computer-aided manufacturing (CAD-CAM) dental technologies and dental ceramic materials, the use of digital workflows has increased significantly. Among various types of CAD-CAM ceramic materials, lithium disilicate glass-ceramic and yttria-stabilized zirconia have been used most widely when restoring anterior teeth because of their improved physical and optical properties Various shade and translucency options are available for both lithium disilicate and zirconia.

Increased translucency is generally considered a desirable property for dental ceramic material as it facilitates successful reproduction of the natural translucency of human enamel. When the substrate color (stump shade) is relatively close to the desired final shade, using translucent ceramic materials on prepared natural teeth may be an excellent strategy, allowing the fabrication of ceramic restorations that closely reproduce optical characteristics of human teeth.[1] However, highly translucent ceramic materials may not be indicated when the stump shade is considerably darker than the desired final shade because such materials have only a limited ability to mask discoloration. In these situations, it is beneficial to select ceramic systems or material combinations that effectively mask the dark stump shade while preserving a natural enamel-like translucency.

This video demonstrates the clinical application of various strategies that dental practitioners can employ when fabricating CAD-CAM ceramic restorations for discolored teeth. Four clinical treatments are presented focused on shade masking strategies, each illustrating a distinct shade masking strategy. Every treatment highlights the process of achieving the common goal, accurate shade matching of ceramic restorations on discolored teeth, through different material combinations and layering techniques.

ABSTRACT

Creating a natural appearance with proper shade matching is critical for achieving successful esthetic outcomes of dental ceramic restorations. Ceramic materials with high translucency are often preferred when restoring teeth with a normal stump shade. However, ceramic materials with increased opacity, such as zirconia, offer significant advantages when restoring discolored teeth. This video presentation describes 4 different ceramic material options that enable clinicians to effectively mask dark stump shades while maintaining the natural appearance of dental ceramic restorations. (J Prosthet Dent 2026;135:435-437)

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Video 1. A video clip is available online. Supplementary material related to this article can be found online at doi:10.1016/j.prosdent.2025.12.010.

The first treatment demonstrates the use of a monolithic zirconia restoration fabricated from zirconia containing 3 mol% or 3–4 mol% yttria (3Y-ZR, 3/4Y-ZR). External stain and glaze were applied on the cameo surface of the restoration to create the illusion of translucency and color variations. The use of 3Y-ZR or 3/4Y-ZR in combination with opaque resin cement provides the maximal masking capacity. However, meticulous application of external staining and careful patient selection are essential because of the increased opacity of the restoration.

The second treatment illustrates the process of adding internal opaque layer to the intaglio surface of the restoration. A monolithic zirconia restoration was fabricated from translucent zirconia containing 5 mol% yttria (5Y-ZR). An opaque liquid coloring agent was applied to the intaglio surface of the restoration prior to sintering to compensate its limited masking capacity. External staining and glazing were performed to achieve adequate shade matching.

The third treatment involves a single implant restoration. After fabricating a gold-hue custom abutment from titanium, opaque 3Y-ZR framework with a facial cutback was fabricated to mask the dark color of the abutment.[2] Veneering ceramic was manually layered on the facial surface to create the desired shade match and esthetics.

The last strategy introduced in this video is fabrication of a bi-layered zirconia-lithium disilicate crown by combining an opaque zirconia framework with a milled lithium disilicate crown. A 0.5–0.7mm thick zirconia coping was fabricated using 3Y-ZR. The coping was placed on the 3D printed cast and scanned to design and mill a lithium disilicate crown precisely fitting over the zirconia coping. After external staining and glazing of the lithium disilicate crown, the 2 components were bonded together to complete the restoration. This approach has been reported to enable the predictable fabrication of ceramic restorations exhibiting acceptable marginal accuracy, improved mechanical strength, and superior masking capability compared with lithium disilicate restorations.[3–5]

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