

APRIL 2017 • V4 • N73

# CE eBook

Continuing Dental Education

ESTHETIC DENTISTRY

## Pink Techniques and Esthetics

With Fluoride-releasing Bioactive Gingiva-colored  
Nanohybrid Composites

*Frank J. Milnar, DDS*

# Pink Techniques and Esthetics

## With Fluoride-releasing Bioactive Gingiva-colored Nanohybrid Composites

### About the Author



Frank J. Milnar, DDS  
Private Practice, St. Paul, Minnesota

*Dr. Milnar has received an honorarium for his preparation and presentation of this program.*

**PUBLISHER**  
Dental Learning Systems, LLC

**BRAND MANAGER, CDEWorld**  
Manda Fredrickson

**SPECIAL PROJECTS MANAGER**  
Justin Romano

**SPECIAL PROJECTS COORDINATOR**  
Angela Buziak

**EDITOR**  
Bill Noone

**DESIGN**  
Jennifer Barlow

**CE COORDINATOR**  
Hilary Noden

CDEWorld eBooks and *Pink Techniques and Esthetics With Fluoride-releasing Bioactive Gingiva-colored Nanohybrid Composites* are published by Dental Learning Systems, LLC.

Copyright ©2017 by Dental Learning Systems, LLC. All rights reserved under United States, International and Pan-American Copyright Conventions. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means without prior written permission from the publisher.

**PHOTOCOPY PERMISSIONS POLICY:** This publication is registered with Copyright Clearance Center (CCC), Inc., 222 Rosewood Drive, Danvers, MA 01923. Permission is granted for photocopying of specified articles provided the base fee is paid directly to CCC.

The views and opinions expressed in the articles appearing in this publication are those of the author(s) and do not necessarily reflect the views or opinions of the editors, the editorial board, or the publisher. As a matter of policy, the editors, the editorial board, the publisher, and the university affiliate do not endorse any products, medical techniques, or diagnoses, and publication of any material in this journal should not be construed as such an endorsement.

**WARNING:** Reading an article in CDEWorld and *Pink Techniques and Esthetics With Fluoride-releasing Bioactive Gingiva-colored Nanohybrid Composites* does not necessarily qualify you to integrate new techniques or procedures into your practice. Dental Learning Systems, LLC expects its readers to rely on their judgment regarding their clinical expertise and recommends further education when necessary before trying to implement any new procedure.

Printed in the U.S.A.

**CEO**  
Daniel W. Perkins

**PARTNER**  
Anthony A. Angelini

**PRESIDENT/COO**  
Karen A. Auiler



Dental Learning Systems, LLC  
P.O. Box 510  
Newtown, PA 18940  
Phone - 267-291-1150



Dental Learning Systems, LLC, is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Concerns or complaints about a CE provider may be directed to the provider or to ADA CERP at ADA.org/CERP



Approval does not imply acceptance by a state or provisional board of dentistry or AGD endorsement. The current term of approval extends from 1/1/2017 to 12/31/2022. Provider # 209722.

# Pink Techniques and Esthetics

## With Fluoride-releasing Bioactive Gingiva-colored Nanohybrid Composites

Frank J. Milnar, DDS

### ABSTRACT

The composition of the smile architecture includes pink gingiva and white tooth structure that complement each other in balance and harmony. While the health and appearance of gingival tissues significantly affect smile esthetics, many patients present with gingival recession that contributes to unsightly smile esthetics. New bioresponsive direct restorative materials represent an opportunity for dentists to directly correct the appearance of an “absence of pink” in a cost-effective and minimally invasive manner, placed according to a comprehensive understanding of the pink components of the smile and requisites for gingival health.

### LEARNING OBJECTIVES

- Discuss the significance of pink esthetics to the composition of the smile architecture.
- Discuss considerations for using direct composite restorative materials to restore pink esthetics.
- Explain the mechanics of building prosthetic gingival restorations with bioactive pink composites.
- Identify the elements of the armamentarium needed for reproducing pink gingival esthetics.

The composition of the smile architecture includes pink and white (ie, gingiva and tooth structure, respectively), which complement each other and must be in balance and harmony in terms of color, texture, shape, polish, and stippling or microtexture. Therefore, the health and appearance of gingival tissues significantly affect smile esthetics. Unfortunately, many patients present with gingival recession, which is characterized by root surface exposure at the gingival margin. Because gingival recession causes unsightly smile esthetics, an increasing number of patients are seeking dentists to address their “absence of pink” through treatment that is cost effective and more convenient than invasive options such as surgical grafting procedures.<sup>1</sup>

Traditionally, treatments for gingival recession and resulting lesions have included specific restorative procedures, depending on causative factors.<sup>2,3</sup> Other approaches have included laser therapy, tissue grafting, flap designs, orthodontics (eg, clear aligners), and guided tissue restoration, each of which is costly, time-consuming, and can potentially require a long, painful recovery for patients.<sup>4</sup>

Class V cervical lesions, a consequence of gingival recession and a factor contributing to smile disharmony, occur due to stress distribution. Vertical loading stresses in the crown of the tooth are transferred into horizontal stresses, then retransferred into the Class V area, where stress accumulates and proceeds vertically down the long axis of the root, creating problematic restorative areas in terms of biomechanical design.<sup>5,6</sup>

Fortunately, solutions for restoring Class V lesions have been developed that do not adversely affect gingival health, produce less inflammatory response, and ultimately contribute to better outcomes than leaving the roots exposed, particularly when the restorations are contoured, finished, and polished well.<sup>7</sup> More recently, manufacturers have been developing “smart materials” that neutralize acid to establish a neutral pH, inhibit plaque formation, and decrease the risk of secondary decay. This emerging frontier of bioactive materials also seeks to harness the benefits of fluoride release, decrease demineralization, and decrease microleakage.<sup>8</sup>

However, using tooth-colored direct composites (eg, typical VITA shades) when treating gingival recession or Class V areas may leave the teeth

appearing very long, contributing to an unesthetic smile.<sup>9</sup> Therefore, it is important to remember that restoring challenging cases in the anterior requires a more comprehensive approach and a deeper understanding of the pink components of the smile, because the gingival architecture represents the frame of the tooth and the smile and is the hallmark of both pink and white esthetics.<sup>10</sup>

### ACHIEVING DIMENSIONS OF PINK ESTHETIC DENTISTRY

Pink esthetic dentistry is the application of comprehensive knowledge of facial esthetics and restorative techniques, combined with detailed patient and interdisciplinary communication, to regenerate the supporting periodontal structures that have been lost due to periodontal disease and/or gingival

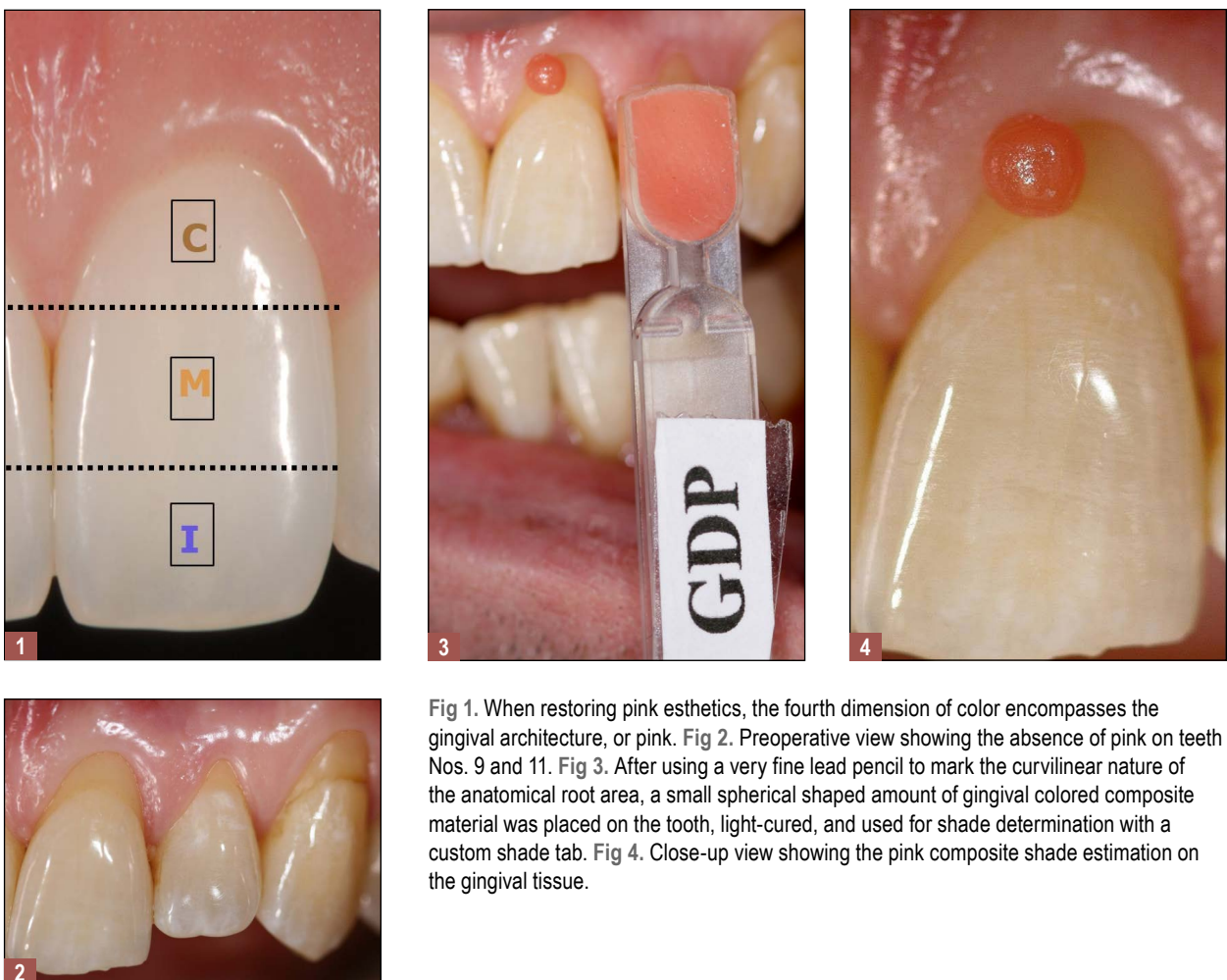


Fig 1. When restoring pink esthetics, the fourth dimension of color encompasses the gingival architecture, or pink. Fig 2. Preoperative view showing the absence of pink on teeth Nos. 9 and 11. Fig 3. After using a very fine lead pencil to mark the curvilinear nature of the anatomical root area, a small spherical shaped amount of gingival colored composite material was placed on the tooth, light-cured, and used for shade determination with a custom shade tab. Fig 4. Close-up view showing the pink composite shade estimation on the gingival tissue.

recession, which can result in dark margins on a tooth crown, exposed roots, black triangles between teeth, and other esthetic deficiencies.<sup>10,11</sup> Whether created with porcelain, denture bis-acryl, or direct composite, these gingival prosthetic restorations are pink, not white, thereby introducing a fourth dimension of color to the restorative process.

For example, traditional color analysis of teeth is completed on three levels (ie, incisal, middle, and cervical) using VITA shade guides. When restoring pink esthetics, the fourth dimension of color encompasses the gingival architecture, or pink (Figure 1).<sup>12,13</sup> According to Coachman, astute clinicians and technicians pay the same level of attention to detail to shade variations and texture when designing gingival prosthetics as they do when replicating tooth anatomy.<sup>10,12,13</sup> Therefore, because the gingival architecture represents the frame of the teeth, if not restored correctly—either surgically or prosthetically—the

3-dimensional outcome of the entire smile design will be impaired, from both micro- and macro-esthetic perspectives.

For this reason, as an ethnically diverse population continues to age and clinicians increasingly encounter patients with gingival recession, customizing shades for gingival prosthetic restorations will be of paramount importance for achieving esthetic outcomes. Clinicians and laboratory technicians have long interpreted pink esthetic shades in denture prostheses and implant-supported prosthetics using bis-acryl and ceramics, respectively.<sup>10,12,13</sup> The use of direct composite restorative materials has also been cited in the literature, at least as far back as 1997,<sup>14</sup> where it was noted that the cervical contour must be created in such a way as to prevent plaque retention. Interestingly, Coachman asserts that when fabricating artificial gingiva using both pink and white, composite resin is better than



Fig 5. The smallest pear-shaped diamond was used with water to carefully cut the rough boundaries of the preparation. Fig 6. Preparation boundaries for teeth Nos. 9 and 11 that were completed using the pear-shaped diamond. Fig 7. A very small inverted cone diamond bur was used to create a slight mechanical interlocking preparation design to maximize retention. Fig 8. Final preparations. Fig 9. After being cleaned with chlorhexidine, the preparations were selectively etched on the enamel only, then rinsed and dried.

using pink porcelain alone because the material is more biocompatible subgingivally, is easier to repair for continual maintenance, and provides excellent esthetics.<sup>10,12,13</sup>

## REQUISITES FOR DIRECT PINK ESTHETIC RESTORATIVES

As dentistry continues to embrace minimal intervention restorative approaches, materials

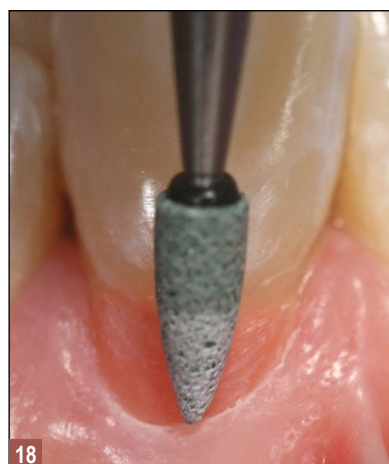
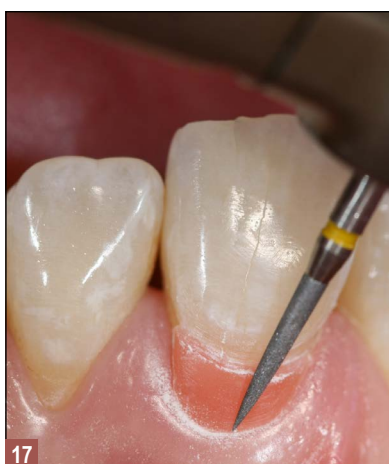
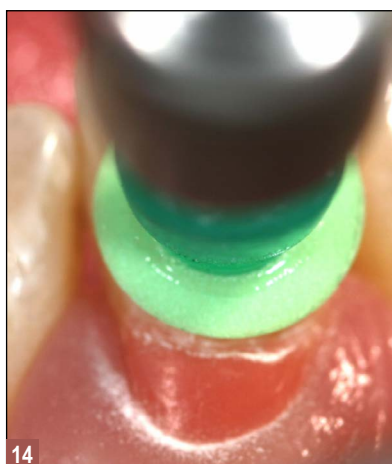
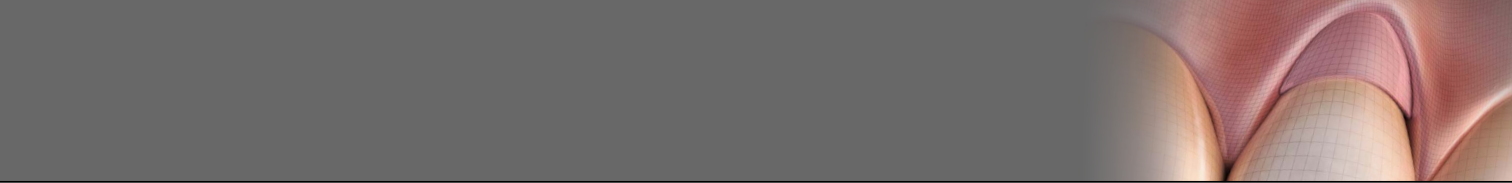


Fig 10. One layer of bonding agent was carefully applied to the preparations using a brush applicator, air-thinned, and then light-cured. Fig 11. The preparation following application of the bonding agent. Fig 12. The layer of gingival-colored composite was placed at the base of the restoration to counteract the modulus of elasticity and establish the pink shade. It was sculpted to the margins and light-cured. Fig 13. To create the sulcus and microtexture, a second layer of composite was placed using a microplacement instrument, working around the margins cervically, and then cured. Fig 14. By hovering over the pink prosthetics and very lightly sanding the artificial sulcus using a green sanding disc, everything created in the pink material was simultaneously cleaned and made symmetrical. Fig 15. All margins were approximated using a polishing disc with semi-spherical particles, an effective approach for when working in tight gingival spaces and to help micromanage the pink part of the restoration. Fig 16. Polishers were used. Fig 17. A yellow flamed diamond bur kit was used for imparting microtexture across all restorations. Fig 18. Diffuse texture and microtexture were created using a green stone.



that are truly restorative and therapeutic, versus inert, will be required. Direct composites have recently been introduced that are bioresponsive and demonstrate bioactivity in terms of fluoride release, inhibiting marginal demineralization after acid exposure, and decreasing the biofilm that accumulates subgingivally and contributes to plaque.<sup>15-17</sup> Such characteristics are essential when creating artificial gingiva and restoring pink esthetics for patients who present with gingival recession (Figure 2), because biofilm and plaque development could result in inflammation of the surrounding natural tissues, caries, and future esthetic compromises.

One available direct composite (Beautifil® II, Shofu Dental, [www.shofu.com](http://www.shofu.com)) that demonstrates these necessary characteristics contains surface pre-reacted glass fillers (S-PRG), a technology known as Giomer. When used to treat gingival recession and Class V lesions, the benefits of this Giomer technology-based composite include an antiplaque effect, remineralization of dentin, discharge and recharge of fluoride ions, and moisture protection for long-term durability.<sup>15-17</sup>

To best achieve an illusion of gingival tissues (ie, an admittedly imperfect simulation that is acceptable at a distance of 3 feet or more), it is imperative that the selected gingiva replacement composite demonstrate light-diffusing properties and a chameleon effect with surrounding natural tissues. The highly filled composition of the aforementioned Giomer-based composite contributes to light refraction and, therefore, optical properties similar to those exhibited by gingival tissues. The replacement composite should also provide a sufficient range of gingival color options to enable suitable shade approximation and custom matching (Figure 3 and Figure 4).

Given the small and delicate gingival area being restored, it is also necessary for gingival composite materials to demonstrate ideal

handling characteristics. These include a non-sticky texture and non-slumping flowable viscosity for precise placement and marginal adaptation. The material's physical properties should include high radiopacity and high compressive strength.

### INDIVIDUALIZING PINK ESTHETIC DENTISTRY

Among the armamentarium required for creating direct composite pink prosthetic restorations are pear-shaped diamonds for carefully cutting the micro box (Figure 5 and Figure 6) and a marginator fine flame diamond (ie, very small inverted cone diamond bur) to create undercuts or micromechanical retention (Figure 7 and Figure 8). Note that there is no radius beveling at the gingival margin; a butt joint is created that will require sealing.

After selectively etching, rinsing, and drying the enamel (Figure 9), a 7th generation bonding agent (eg, BeautiBond®, Shofu Dental)—or one with a 5- $\mu$ m film thickness—is applied to the preparations using a brush applicator (eg, Benda® Brush, Centrix, [www.centrixdental.com](http://www.centrixdental.com)). Care must be taken to place the adhesive precisely to avoid debris along the gingival preparation lines to prevent tissue irritation. The adhesive should be air-thinned and light-cured (Figure 10 and Figure 11).

To achieve such benefits as enhanced flow capabilities in gingival areas, a composite warmer can be used. A ball burnisher (eg, #18, Hu-Friedy, [www.hu-friedy.com](http://www.hu-friedy.com)) is an appropriate tool for transferring the composite. The first layer of gingival composite is placed, and a Goldstein microplacement instrument can be used to precisely work the margins prior to light-curing; this ensures no excess remains that could potentially cause gingival tissue inflammation or shrinkage (Figure 12). The sulcus and microtexture are created by placing a second layer of composite using the microplacement instrument and then curing (Figure 13).

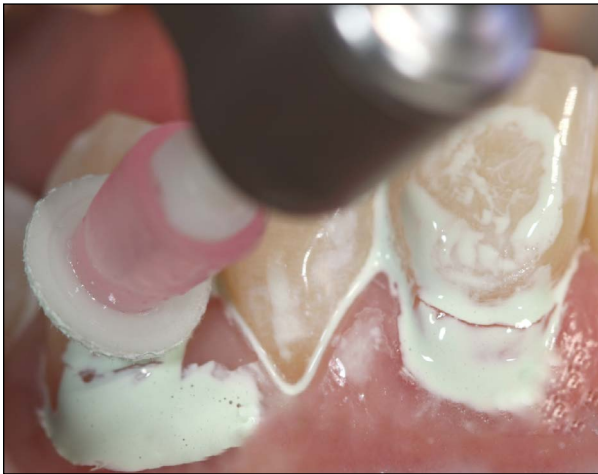


Fig 19. A small, synthetic velvet mini buff disc and polishing paste were used to impart a predictable luster to the gingival restorations.



Fig 20. Postoperative view of the completed composite restorations provided to treat “the absence of pink.” Note that this gingival prosthetic solution is repairable, non-invasive, and cost effective for patients.

To begin finishing pink restorations, a series of finishing discs, burs, and polishers are used. First, a high luster is created—even in the tight marginal areas—using polishing discs (eg, Super-Snap X-Treme™, Green, Shofu Dental) to help decrease the likelihood of microorganisms accumulating in voids and defects (Figure 14). Then, all margins can be approximated using a polishing disc with semi-spherical particles (eg, Super-Snap X-Treme, Red) (Figure 15). A one-step aluminum-oxide polisher (eg, OneGloss®, Shofu Dental) is then used prior to imparting the microtexture (Figure 16).

Then, to begin diffusing light—rather than create a high-shine, high-luster appearance—and imparting microtexture, the necessary armamentarium includes a yellow flamed diamond (Figure 17), while a green stone (eg, Dura-Green Stones, Shofu Dental) is used to diffuse the surface texture (Figure 18). The realistic luster synonymous with gingival tissue can be created using a small, synthetic velvet mini buff disc (Figure 19) and polishing paste.

## CONCLUSION

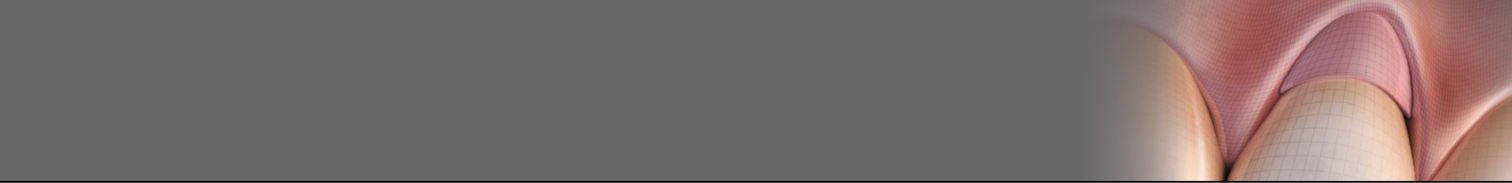
The gingival architecture represents the framework for the teeth. Restoring the esthetics of this pink component of the smile, however, is not

about precise shade matching or anatomical duplication. Rather, pink esthetics is fundamentally an illusion (Figure 20) that is a cost-effective, minimally invasive solution for many patients with gingival recession and an absence of pink. When created with new bioresponsive direct restorative materials, pink esthetic restorations also represent an opportunity for dentists to preserve their patient’s oral health.

## REFERENCES

1. Zalkind M, Hochman N. Alternative method of conservative esthetic treatment for gingival recession. *J Prosthet Dent.* 1997;77(6):561-563.
2. Bartlett DW, Shah P. A critical review of non-carious cervical (wear) lesions and the role of abfraction, erosion, and abrasion. *J Dent Res.* 2006;85(4):306-312.
3. de Melo FV, Belli R, Monteiro S Jr, Vieira LC. Esthetic noncarious Class V restorations: a case report. *J Esthet Restor Dent.* 2005;17(5):275-284.
4. Kassab MM, Badawi H, Dentino AR. Treatment of gingival recession. *Dent Clin North Am.* 2010;54(1):129-140.
5. Ceruti P, Menicucci G, Mariani GD, et al. Non carious cervical lesions: a review. *Minerva Stomatol.* 2006;55(1-2):43-57.
6. Bartlett DW, Shah P. A critical review of non-carious cervical (wear) lesions and the role of abfraction, erosion, and





abrasion. *J Dent Res*. 2006;85(4):306-312.

7. Blank LW, Caffesse RG, Charbeneau GT. The gingival response to well-finished composite resin restorations. *J Prosthet Dent*. 1979;42(6):626-632.

8. Gordon VV, Mondragon E, Watson RE, et al. A clinical evaluation of a self-etching primer and a giomer restorative material: results at eight years. *J Am Dent Assoc*. 2007;138(5):621-627.

9. van Dijken JW, Sjöström S, Wing K. The effect of different types of composite resin fillings on marginal gingiva. *J Clin Periodontol*. 1987;14(4):185-189.

10. Coachman C, Salama M, Garber D, et al. Prosthetic gingival reconstruction in a fixed partial restoration. Part I: introduction to artificial gingiva as an alternative therapy. *Int J Periodontics Restorative Dent*. 2009;29(5):471-477.

11. Wahbi, MA, Al Sharief HS, Tayeb H, Bokhari A. Minimally invasive use of coloured composite resin in aesthetic restoration of periodontially involved teeth: Case report. *Saudi Dent J*. 2013;25(2):83-89.

12. Salama M, Coachman C, Garber D, et al. Prosthetic gingival reconstruction in the fixed partial restoration. Part

2: diagnosis and treatment planning. *Int J Periodontics Restorative Dent*. 2009;29(6):573-581.

13. Coachman C, Salama M, Garber D, et al. Prosthetic gingival reconstruction in fixed partial restorations. Part 3: laboratory procedures and maintenance. *Int J Periodontics Restorative Dent*. 2010;30(1):19-29.

14. Zalkind M, Hochman N. Alternative method of conservative esthetic treatment for gingival recession. *J Prosthet Dent*. 1997;77(6):561-563.

15. Han L, Okamoto A, Fukushima M, Okiji T. Evaluation of a new fluoride-releasing one-step adhesive. *Dent Mater J*. 2006;25(3):509-515.

16. Perdigão J, Geraldeli S. Bonding characteristics of self-etching adhesives to intact versus prepared enamel. *J Esthet Restor Dent*. 2003;15(1):32-41.

17. Ikemura K, Tay FR, Endo T, Pashley DH. A review of chemical-approach and ultramorphological studies on the development of fluoride-releasing dental adhesives comprising new pre-reacted glass ionomer (PRG) fillers. *Dent Mater J*. 2008;27(3):315-339.

## Pink Techniques and Esthetics

With Fluoride-releasing Bioactive Gingiva-colored Nanohybrid Composites

Frank J. Milnar, DDS

- Treatment that is cost effective and more convenient than invasive options such as surgical grafting procedures is increasingly being sought to address:**
  - replacement of missing teeth.
  - problems related to malocclusion.
  - absence of pink.
  - demineralization.
- Class V cervical lesions, a consequence of gingival recession and a factor contributing to smile disharmony, occur due to:**
  - fluorosis.
  - stress distribution.
  - use of inert materials.
  - lack of shade customization.
- What have been developed to neutralize acid, inhibit plaque formation, and decrease the risk of secondary decay?**
  - tooth-colored direct composites
  - “smart” or bioactive materials
  - 7th generation bonding agents
  - yellow flamed diamonds
- Restoring challenging cases in the anterior requires a comprehensive approach and a deep understanding of:**
  - the pink components of the smile.
  - implant dentistry.
  - biocompatibility.
  - osseointegration.
- When restoring pink esthetics, which dimension of color encompasses the gingival architecture?**
  - first
  - second
  - third
  - fourth
- The gingival architecture represents:**
  - the body of the teeth.
  - the frame of the teeth.
  - the middle portion of a tooth.
  - the black triangles between teeth.
- According to Coachman, when fabricating artificial gingiva using both pink and white, what material is better than using pink porcelain alone?**
  - composite resin
  - glass-ionomer cement
  - composite polishing paste
  - zinc oxide eugenol
- Biofilm and plaque development could result in:**
  - inflammation of the surrounding natural tissues.
  - caries.
  - future esthetic compromises.
  - All of the above
- To best achieve an illusion of gingival tissues the selected gingiva replacement composite should demonstrate:**
  - light-diffusing properties.
  - limited gingival color options.
  - a very thick viscosity.
  - All of the above
- Pink esthetics is fundamentally:**
  - all about shade matching.
  - achieving anatomical duplication.
  - highly invasive.
  - an illusion.

This article provides 2 hours of CE credit from Dental Learning Systems, LLC. To participate in the CE lesson for a fee of \$0, please log on to <http://cdeworld.com>. Course is valid from 4/1/17 to 4/30/20. Participants must attain a score of 70% on each quiz to receive credit. Participants will receive an annual report documenting their accumulated credits, and are urged to contact their own state registry boards for special CE requirements.



Dental Learning Systems, LLC, is an ADA CERP Recognized Provider. ADA CERP is a service of the American Dental Association to assist dental professionals in identifying quality providers of continuing dental education. ADA CERP does not approve or endorse individual courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry. Concerns or complaints about a CE provider may be directed to the provider or to ADA CERP at [ADA.org/CERP](http://ADA.org/CERP)



Approval does not imply acceptance by a state or provisional board of dentistry or AGD endorsement. The current term of approval extends from 1/1/2017 to 12/31/2022. Provider #: 209722.