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An increasing number of enquiries about co-curing has prompted a summary of the technique

Improvements in physical properties and community requests for 'tooth coloured' restorations is seeing increasing uses of composite resins for a wide range of restorative procedures. However, problems with contact areas, post operative sensitivity, difficulty in finishing and recurrent caries leaves many practitioners wary about using them.

The co-curing technique is based upon using a resin modified glass ionomer cement (RMGIC) as an intermediary bonding agent between composite resin and tooth structure in order to compensate for polymerization shrinkage. Both at the restorative interface and within the body of the composite resin during post polymerization shrinkage. Bond strengths to tooth structure are similar to resin based bonding systems.

The following 12 step sequence describes the placement of a Class II resin using this technique:

- Prepare the cavity using a minimally invasive approach to optimize the remaining healthy tooth structure. A caries detector is indicated where caries have undermined the enamel or access is difficult.
- Place a small amount of 37 per cent phosphoric acid on the preparation for 10 seconds and thoroughly wash and dry with oil free air. Fig. 1.
- Isolate the preparation from the oral environment, using a rubber dam if indicated.

The inability to achieve a predictable proximal contact area has been a major clinical problem with plastic restorative materials. The Palodent[®] sectional matrix system will overcome this problem in most clinical situations.

- Insert the matrix in the proximal region, wedge the cavo floor with a paper point (sufficient to hold a matrix in place and also absorbs crevicular exudate) and place the bitine ring using a pair of rubber dam clamp holders.
- Into a Dappen's dish, mix a low viscous preparation of RMGIC, Fuji Bond LC, Fuji II LC, Vitremer. Smear a thin

layer of RMGIC over the dentinal surfaces of the cavity preparation (as a cavity liner) with a micro brush. Fig. 2.

- Cure the RMGIC for 20 seconds. A well polymerized cement lining avoids post operative sensitivity. Fig. 3.
- Smear a second layer of RMGIC over the base and walls of the preparation, avoiding the enamel margins at the occlusal surface. Fig. 4.
- Place an increment of composite resin, less than 2 mm thick, into the uncured RMGIC. Fig. 5.
- Upon photo initiation, the composite will polymerize before the RMGIC and undergo initial polymerization shrinkage before the RMGIC has set, thus creating a low stress interface between the resin and dentine. This is the basis of the co-cured technique. Fig. 6.

When composite resin polymerizes, 40 per cent of total polymerization shrinkage occurs after initial photo initiation. Clinically, this means that composite resin restorations should be limited to 2 mm of thickness to avoid high levels of post polymerization stress within the composite resin. Restorations that have been built up using small incremental placements will still exhibit an overall post polymerization shrinkage of 40 per cent. This problem may be overcome by smearing a thin layer of RMGIC between increments of resin so that post polymerization shrinkage occurs incrementally within each layer of resin separated by the RMGIC.

- Once the first layer of composite and RMGIC has been photo initiated, smear a further layer of RMGIC over the entire preparation, including the enamel walls. Fig. 7.

• Place an increment of composite resin to fill the remaining cavity. It is important to burnish the cavo margins with a ball ended burnisher to minimize the thickness of RMGIC at the surface interface of the restoration. Fig. 8.

- Photo initiate this layer of resin and RMGIC for 20 seconds. Fig. 9.
- Remove the bitine ring with rubber dam clamp holders and the matrix with a pair of artery forceps (such is the firmness of the contact area). Photo initiate the proximal surface from the buccal and lingual aspects for a further 20 seconds. Fig. 10.
- Contour the occlusal surface to accommodate the bite with particular attention in rounding over the marginal ridge. This will minimize the possibility of future fracture in this critical region.
- Separate the proximal surfaces with dental floss and polish interproximally with non metallic abrasive strips and finish the restoration with rubber wheels, fine discs or polishing pastes.
- Smear a thin layer of coating resin (Resis[®]) over the occlusal surface and margins. This will improve wear resistance and help protect any RMGIC inadvertently exposed at the margins of the restoration from occlusal abrasion. Fig. 11.
- Light cure occlusal surface for 20 seconds. Fig. 12.

Apart from the reassurance of knowing that the entire restoration has been lined with a glass ionomer cement, this technique creates a low stress bond at the restorative interface, rarely causes undiagnosable post-operative discomfort and takes less time to place than a composite resin restoration using a resin based bonding system. *The quality of the restoration has improved and the cost of placing it reduced!* ▶

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 †Halas Dental, Waterloo, NSW.
 ‡3M Australia, Pennant Hills, NSW.
 §Nulite Systems International, Hornsby, NSW.

Quick Pics



Fig. 1. Etch enamel and dentine surfaces for 10 seconds with 37 per cent Phosphoric Acid.

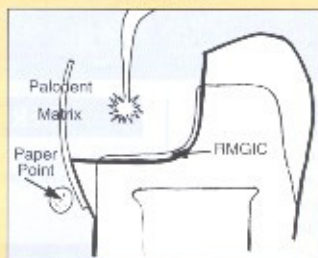


Fig. 2. Place matrix and paper point, mix Fuji Bond LC and smear over dentine surfaces.



Fig. 3. Photo initiate lining for 20 seconds.

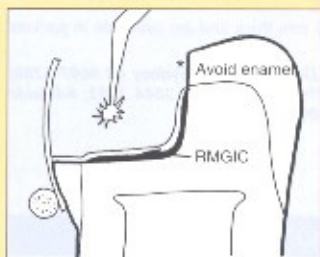


Fig. 4. Smear Fuji Bond LC over base and walls of cavity up to DEJ.



Fig. 5. Place an increment of composite resin into cavity about 2mm thick.

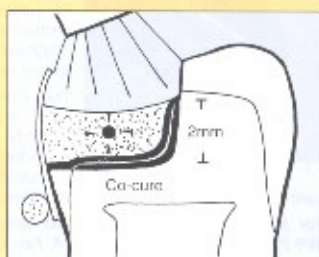


Fig. 6. Co-cure composite resin and Fuji Bond LC for 20 seconds.



Fig. 7. Smear a layer of Fuji Bond LC over base of preparation and enamel walls.



Fig. 8. Place an increment of composite and burnish occlusal margins.

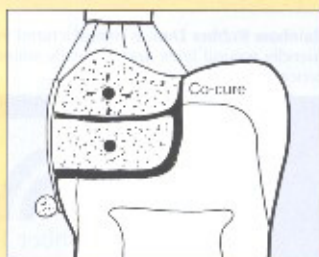


Fig. 9. Co-cure composite resin and Fuji Bond LC for 20 seconds.

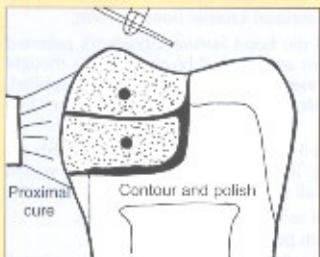


Fig. 10. Remove matrix, cure proximal surfaces for 20 seconds and finish restoration.

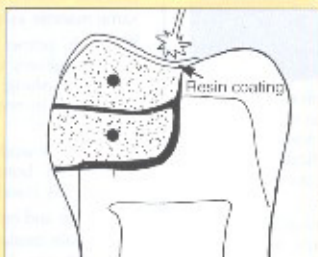


Fig. 11. Smear resin coating over occlusal surface and margins.

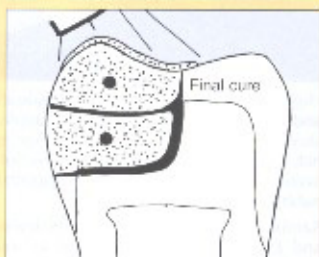


Fig. 12. Light cure for 20 seconds.