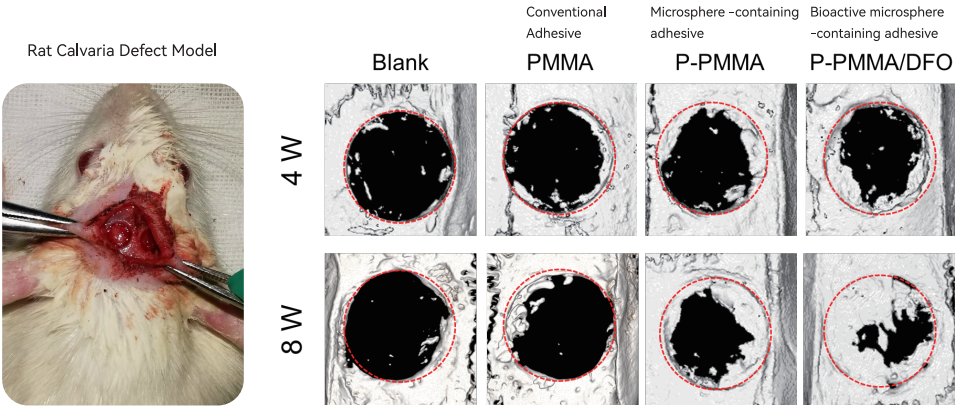


Surgery



The first bond adhesive enabling simultaneous bonding and intra-cement osteogenesis.

Academic Collaboration: Experimental outcomes of Super Pet Bond were featured as the cover article in the premier British journal *Journal of Materials Chemistry B*

Abstract: Polymethyl methacrylate (PMMA) based biomaterials have been widely utilized in clinics. However, currently, PMMA catalyzed by benzoyl peroxide (BPO) exhibits disquieting disadvantages including an exothermic polymerization reaction and a lack of bioactivity. Here, we first designed three industrial-scale synthesis methods for high-purity butoxydibutylborane (BODBB), achieving purity levels greater than 95% (maximum: 97.6%) and ensuring excellent fire safety. By utilizing BODBB as a catalyst, the highest polymerization temperature of PMMA bone cement (PMMA-BODBB) reached only 36.05 °C, ensuring that no thermal damage occurred after implantation. Compared to PMMA catalyzed by BPO and partially oxidized tributylborane (TBBO, catalyst of Super Bond C&B), PMMA-BODBB exhibited superior cell adhesion, proliferation, and osteogenesis, attributed to the reduced release of free radicals and toxic monomer, and moderate bioactive boron release. After injection into a 5 mm defect in the rat cranial bone, PMMA-BODBB demonstrated the highest level of osteointegration. This work not only presents an industrial-scale synthesis of high-purity BODBB, but also offers an innovative PMMA biomaterial system with intrinsic biocompatibility and osseointegration, paving the way for the next generation of PMMA-based biomaterials with broader applications.

From the journal:  
**Journal of Materials Chemistry B**

**High-purity butoxydibutylborane catalysts enable the low-exothermic polymerization of PMMA bone cement with enhanced biocompatibility and osseointegration**

[Zhao Wan](#), [Yike Gao](#), [Yingbo Wang](#), [Xianghao Zhang](#), [Xiyin Gao](#), [Tuanfeng Zhou](#), [Zhishan Zhang](#), [Zijian Li](#), [Yunfei Lin](#), [Bing Wang](#), [Kun Chen](#), [Yang Wang](#), [Chenggang Duan](#) and [Zuoying Yuan](#)

**Abstract**

Polymethyl methacrylate (PMMA) based biomaterials have been widely utilized in clinical. However, current PMMA catalyzed by benzoyl peroxide (BPO) exhibits disquieting disadvantages including an exothermic polymerization reaction and a lack of bioactivity. Here, we first designed three industrial-scale synthesis methods for high-purity butoxydibutylborane (BODBB), achieving purity levels greater than 95% (maximum: 97.6%) and ensuring excellent fire safety. By utilizing BODBB as a catalyst, the highest polymerization temperature of PMMA bone cement (PMMA-BODBB) reached only 36.05 °C, ensuring that no thermal damage occurred after implantation. Compared to PMMA catalyzed by BPO and partially oxidized tributylborane (TBBO, catalyst of Super Bond C&B), PMMA-BODBB exhibited superior cell adhesion, proliferation, and osteogenesis, attributed to the reduced release of free radicals and toxic monomer, and moderate bioactive boron release. After injection into a 5mm defect in the rat cranial bone, PMMA-BODBB demonstrated the highest level of osteointegration. This work not only presents an industrial-scale synthesis of high-purity BODBB, but also offers an innovative PMMA biomaterial system with intrinsic biocompatibility and osseointegration, paving the way for the next generation of PMMA-based biomaterials with broader applications.

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Tel: 0573-88902205

Product Name

Super Pet Bond Adhesive Resin Cement

Contents

1

Cooling Plate

2

Mixing Dish

3

Stainless Steel Drop Syringe

4

Measuring Spoon

5

Brush Handle

6

Catalyst

7

Dental Needles

8

Brush Tips (Bulk-Mix)

9

Brush Tips (Brush-Dip)

10

Needle Sealing Stopper

11

Teeth Primer

12

Monomer

13

Polymer (Radiopaque)

14

Polymer (Clear)



## Clinical Indications

1. Root canal filling and obturation

2. Restoration of tooth defects
3. Crown cementation

4. Bone defect filling
5. Fracture bonding

6. Cranial bone filling and bonding

## Catalyst Assembly

01

Unscrew the rear cap of the stainless steel drop syringe.



02

Insert the cartridge-type catalyst into the syringe, screw on the rear cap, and tighten the plunger.



03

Attach a dental anesthetic needle (30G).



04

Insert the needle tip into the rubber stopper immediately to seal out air.  
\*Re-insert into stopper immediately after each use. If needle becomes clogged due to oxidation, replace with a new needle.



## Tooth Surface Preparation

Moisture Control

Moisture isolation using a rubber dam or cotton rolls is highly recommended. (Remove all calculus prior to application)

Cleaning

Use a brush with fluoride-free, oil-free pumice to clean debris and stains from the tooth surface. Rinse and dry.

Surface Conditioning

Apply tooth surface conditioner directly with a small brush.

Rinse and Dry

Thoroughly rinse with water and dry.

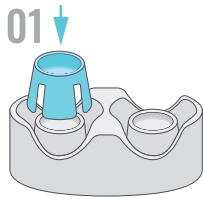
| Conditioning Time | Dentin | Enamel |
|-------------------|--------|--------|
|                   | 5-10s  | 30-60s |

## Instructions for Use 1 Mixing Method

01

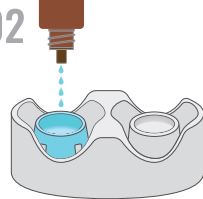
Pre-cool the cooling plate: Place it in a -18°C freezer for 15 minutes.

Remove the cooling plate from the refrigerator. Place the mixing dish into the groove so that its base contacts the plate.



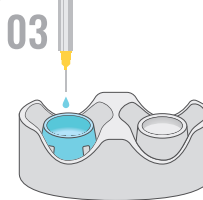
02

Hold the monomer bottle vertically upside down and dispense the required number of drops into the mixing dish (see dosage table below).



03

Assemble the catalyst with the stainless steel drop syringe and needle. Dispense the required drops of catalyst into the monomer. Gently stir with a brush to produce the activator liquid.



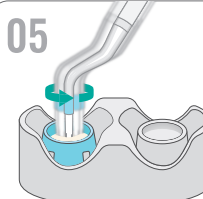
04

Using the provided measuring spoon, add polymer powder to the activator liquid.



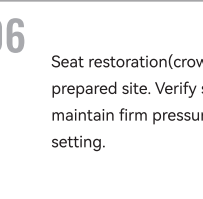
05

Stir gently with a brush. Immediately apply the mixture to the bonding surface or crown (the mixture is flowable; ensure coverage of concave surfaces).



06

Seat restoration(crown/inlay.etc) immediately into prepared site. Verify seating alignment and maintain firm pressure without movement during setting.



07

Excess Removal:

Pre-protection:

Before bonding, cover adjacent non-bonded surfaces (e.g., gingiva, adjacent teeth) with a rubber dam or protective coating.

Timely Removal:

Remove excess material immediately after initial set (before complete hardening). Delayed removal may cause difficulty, tissue irritation, or occlusal issues. Common tools: scaler, dental floss, or polishing instrument.

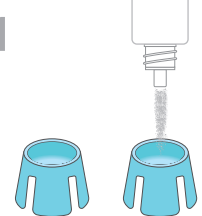
Proportioning Guide:

| Monomer | Catalyst | Polymer Powder |
|---------|----------|----------------|
| 4 drops | 2 drops  | 1.0-1 scoop    |
| 8 drops | 4 drops  | 1.0-2 scoop    |

## Instructions for Use 2 Brush-Dip Technique

01

Pour an appropriate amount of polymer powder into a dispensing cup.



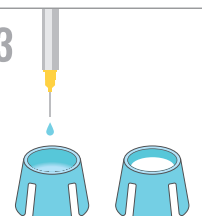
02

Hold the monomer bottle vertically upside down and dispense the required drops into the mixing dish (see dosage table below).



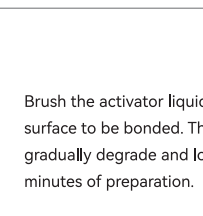
03

Assemble the catalyst with the stainless steel drop syringe and needle. Dispense the required drops of catalyst into the monomer. Gently stir with a brush to produce the "activator liquid."



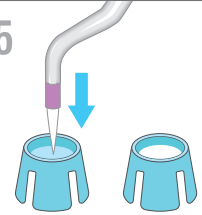
04

Brush the activator liquid evenly onto the surface to be bonded. The activator will gradually degrade and lose activity; use within 5 minutes of preparation.



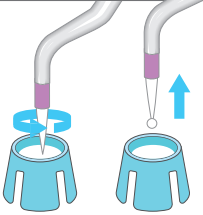
05

Dip the brush tip (pointed) into the activator liquid.  
\*When repeating, clean the brush with gauze before re-dipping.



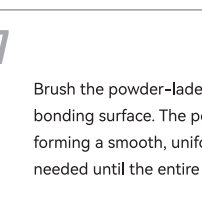
06

Touch the brush to the polymer powder in the dispensing cup to pick up a small amount on the moistened tip.



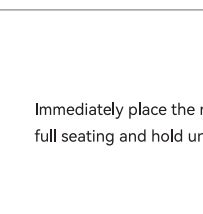
07

Brush the powder-laden tip onto the pre-wetted bonding surface. The powder will quickly spread, forming a smooth, uniform paste layer. Repeat as needed until the entire surface is covered.



08

Immediately place the restoration. Confirm full seating and hold until the cement sets.



09

Excess Removal:

Pre-Protection:

Use a rubber dam or protective coating to shield adjacent non-bonded surfaces.

Timely Removal:

Remove excess cement before it hardens to avoid difficulty in removal.

Proportioning Guide:

| Monomer | Catalyst |
|---------|----------|
| 4 drops | 2 drops  |
| 8 drops | 4 drops  |