

Review of Composite Resins' History and Technology of Kuraray

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Masayuki Asada, Ph. D
Planning & Development Dept.
Dental Material Division
Kuraray Medical Inc.

Basic Formulation of Resin Materials



Monomers (Methacrylates)



Initiators



Paste Composition

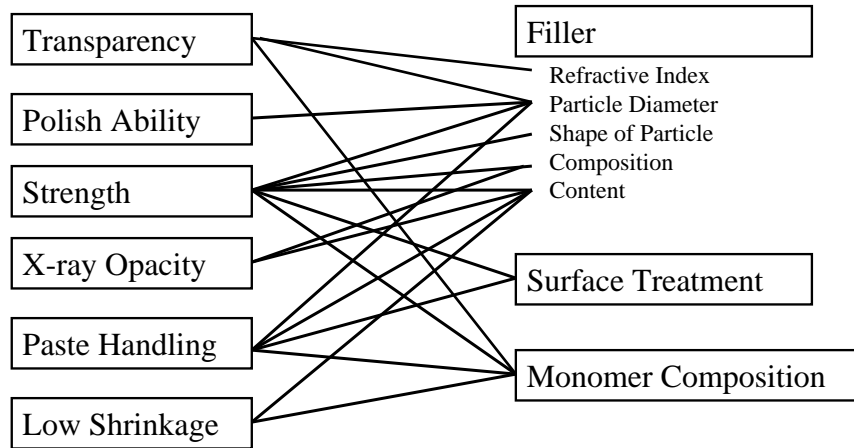
- Composite resin
- Resin Cement



Fillers (Glass Powder, Silica Powder)

For reinforcement
For adjustment of consistency

Relation of Requirements and Basic Technology



Basic Concepts of Kuraray's CR

- Reliability of restoration
 - Mechanical Strength
 - Compressive, Flexural, Diametral
 - High Filler Loadings
 - Durability of restoration
 - High degree of polymerization
 - Multi functional monomer
 - Strong Adhesion between filler and matrix resin
- Durability of product
 - Stable performance during shelf life



History of Anterior Use Composite Resin

Clearfil F	Hybrid type
Clearfil FII	Bis-GMA base
Clearfil F3	Silica base filler

Photo Clearfil Bright	MFR type hybrid
Clearfil Photo Anterior	Bis-GMA base
Clearfil ST	Silica base filler

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History of Posterior Use Composite Resin

Clearfil Posterior	Hybrid type
Clearfil Posterior 3	4 Functional Methacrylate Monomer Glass Ceramic Filler and Silica Base

Clearfil Photo Posterior	Hybrid type 4 Functional Methacrylate Monomer Ba Glass Filler Base Light Polymerization
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History of Universal Use Composite Resin

Clearfil Photo A

Hybrid type
Light polymerization
Bis-GMA and Silica base

Clearfil AP-X

Hybrid type
Light polymerization
Bis-GMA and Ba glass base

Concepts of Majesty Series

•Majesty Esthetic

- Optically Tooth-mimetic Hybrid Composite for Anterior Oriented Universal Use*
- Easy Esthetic Mono-layer restoration system*

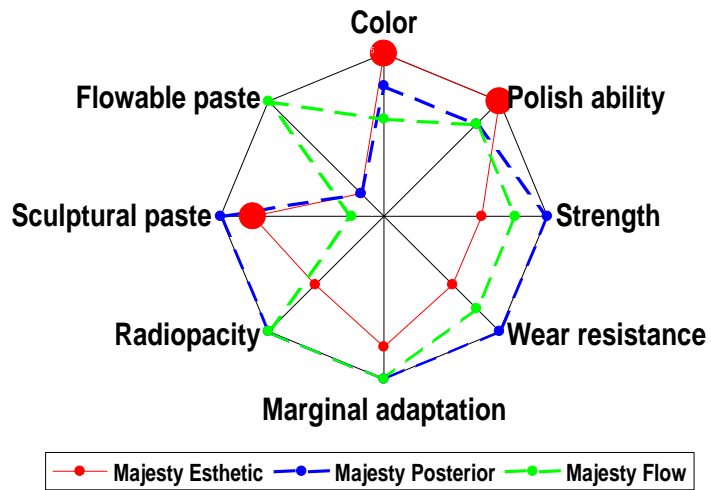
•Majesty Posterior

- Nano-Superfilled Hybrid Composite*
- Reliable Strength, Wear Resistance and Marginal Adaptation*

•Majesty Flow

- Flowable Superfilled Hybrid Composite*
- Mechanically Reliable Flowable type CR for Universal Use*

Concept of Majesty Series



Concept and Technological Design of New Composite Resins

MAJESTY Esthetic

CLEARFIL MAJESTY Esthetic



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Key Technology

High transparent, light diffusive
pre-polymerized organic filler



High transparent, sub-micrometer Ba glass filler



Hydrophobic aromatic
dimethacrylate



Light Diffusion
Least Transparency Change
in Polymerization

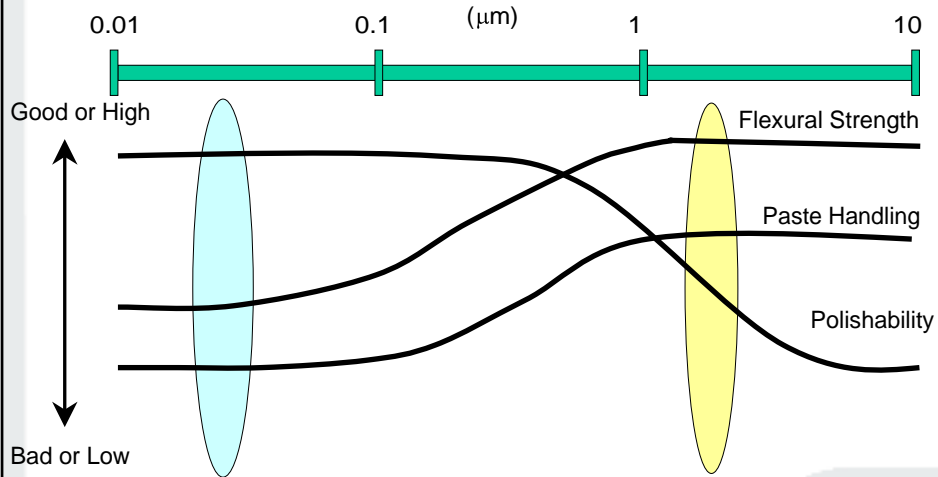
Dense Packing of Ba glass filler



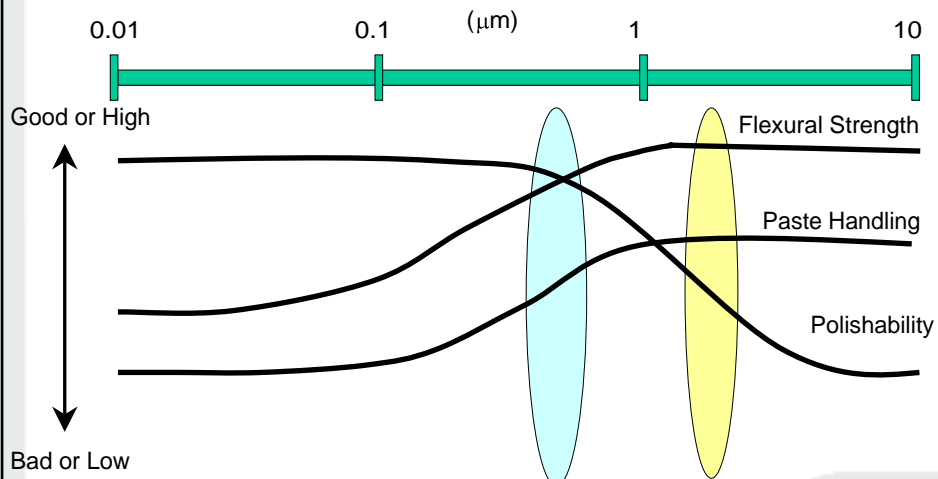
Strength
Wear Resistance
Radiopacity

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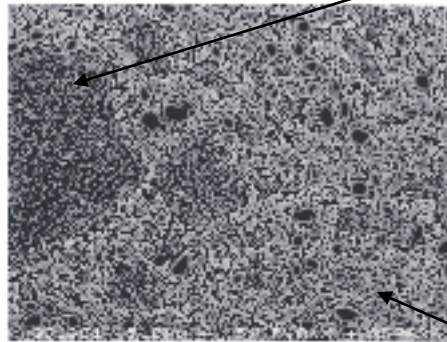
Filler size gives various influences to CR



Filler size gives various influences to CR



Filler Composition



Light Diffusion Filler

Newly developed compound organic filler.
High transparency and
excellent **light diffusion**

High refractive index matrix

High refractive matrix
? high transparency

Radiopaque fine filler

Newly developed filler has high Radiopacity
and polishability!

Courtesy of Dr. Yamada / Toranomon Hospital

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Principal Ingredients

Fillers: 78wt% (66vol%)

- Pre-polymerized organic filler
- Ba glass filler

Monomer : 22wt%

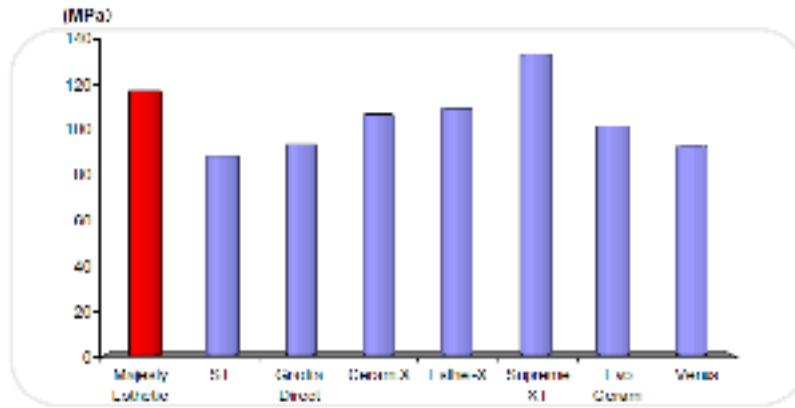
- Bisphenol A diglycidylmethacrylate (Bis-GMA)
- Hydrophobic aromatic dimethacrylate
- Hydrophobic aliphatic dimethacrylate
- dl-Camphorquinone
- Others

Standard Shade: A1, A2, A3, A3.5, A4, B2, B3, C3, HO

Assist Shade: OA2, OA3, OA4, E, XL, OC, T, AM

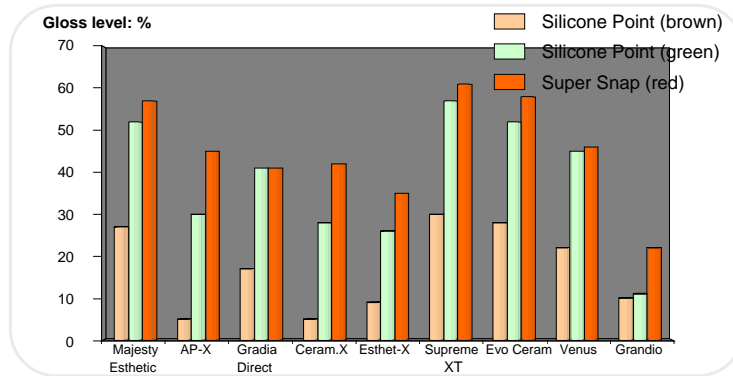
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Flexural Strength



Source: Kuraray Medical Inc., Japan

Polishability

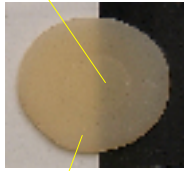


Source: Kuraray Medical Inc., Japan

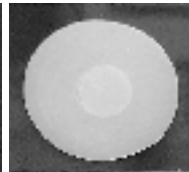
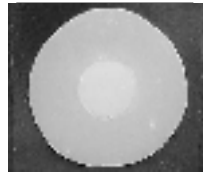
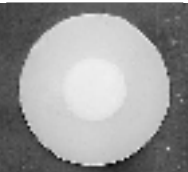
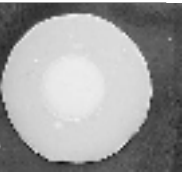
Polish: Silicone Point: wet, low speed (8500rpm), 30sec.
Super Snap: dry low speed (8500rpm), 30sec.

Least Change of Transparency in Polymerization

Before
Polymerization



After
Polymerization



C ERAM-X

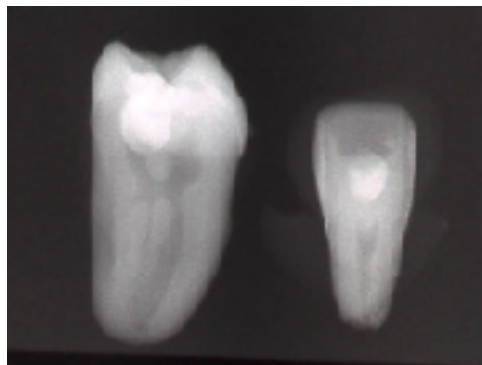
PREMISE

POINT4

SUPUREME

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Radiopacity



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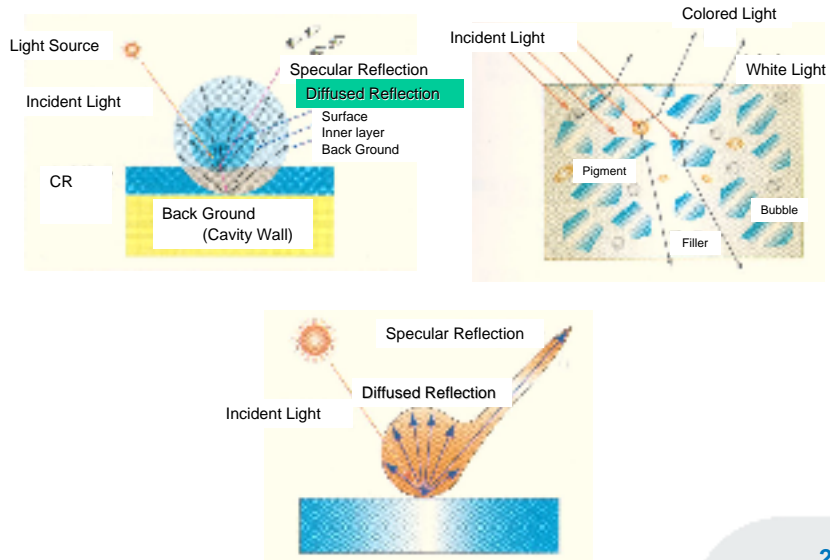
How to Achieve Actual Easy Color Matching

Change of Appearance of Restorative due to Observation Direction

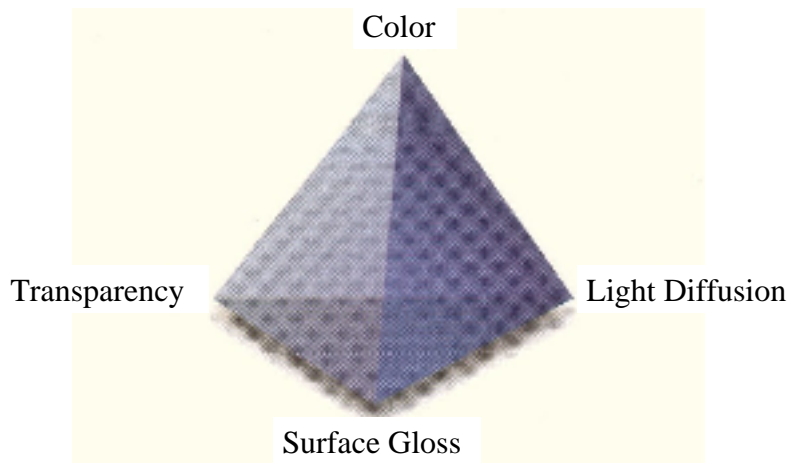


Courtesy by Dr. S. Inokoshi

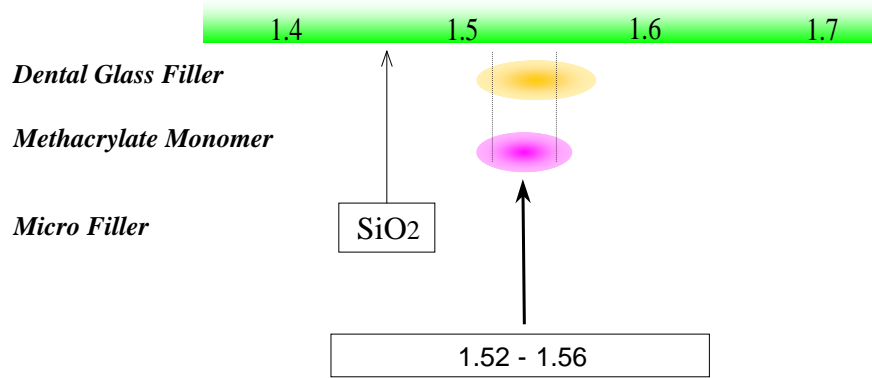
Origin of Color



Four Factors for CR's Color Matching



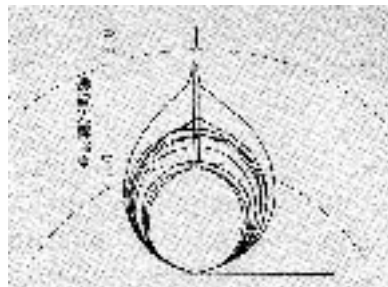
Refractive indices control for high transparency



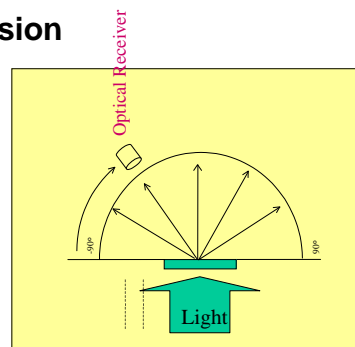
Refractive indices control and Low contamination filler size reduction enables design of highly transparent composite resin system.

Characteristic of Natural Teeth

Light Diffusion & transmission

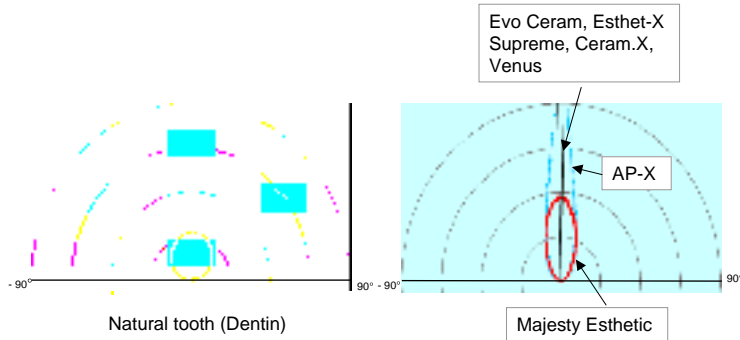


Light Diffusion in Natural Teeth (Dentin)



Goniophoto Meter

Light Diffusion

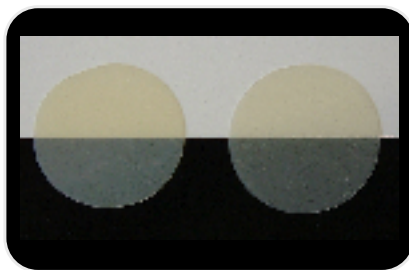


Majesty Esthetic gives similar light diffusion to human dentin.

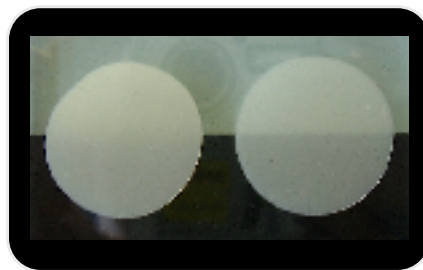
Transparency & Light Diffusion

Transparency
(Sample "on" the paper)

Light Diffusion
(Sample "off" the paper)

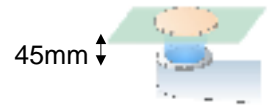
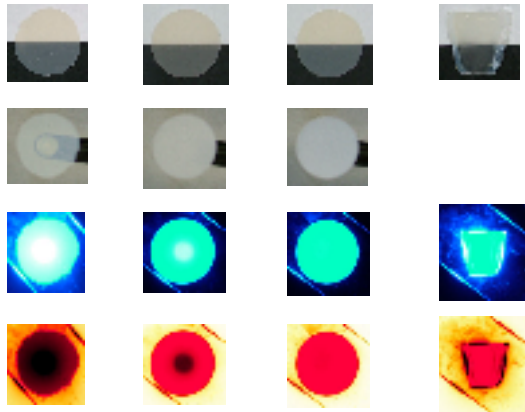


Majesty Esthetic Competitive product
↓ ↓
Boundary: visible visible
visible
Similar transparency



Majesty Esthetic Competitive product
↓ ↓
Boundary: not visible visible
high low
light diffusion

Light Diffusion or Transmission



Sample Thickness : 0.25mm
 Glass Plate Thickness: 2mm
 Light Activator : L.E.Demetron I

Point 4 AP-X MJ Human Tooth

Light Transmitting Product



Majesty Esthetic

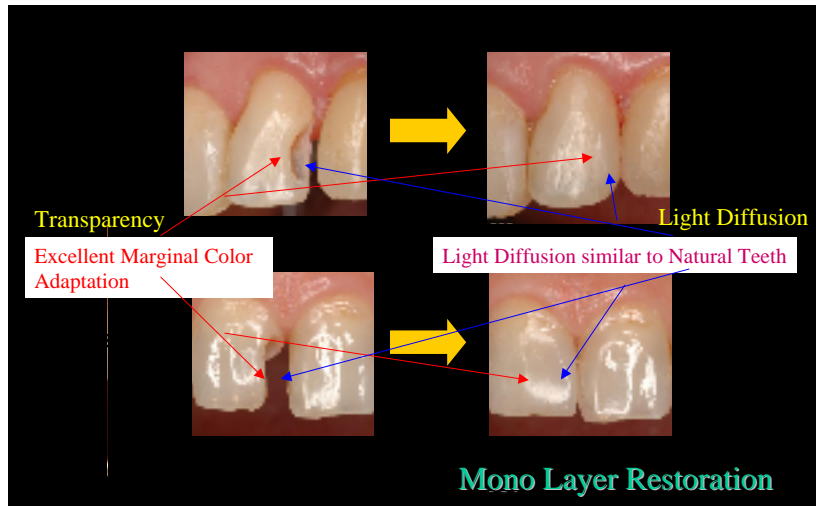


Dark restoration

Filtek Supreme XT

Mono layer (1 shade) restoration

Compatibility between Transparency & Light Diffusion



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Color System of Majesty Esthetic

Standard Shades

Almost clinical cases
Mono-layer Restoration
Light Diffusion Property

Assist Shades

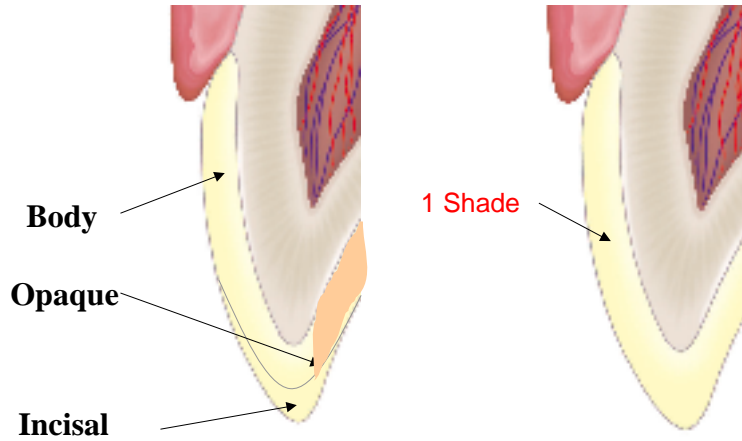
Extra clinical cases
depend on cavity, tooth etc.
Multi-layer Restoration
Light Transmitting Property
for T paste

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Color Matching Procedure

Existing Products

Majesty Esthetic



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Majesty A2



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Majesty A2



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Majesty A2



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Light Diffusion Property

- Light Diffusion : similar to human dentin
- Color Reproduction : 1-shade restoration (Basic)

Strength

- Flexural Strength: 118MPa
- Flexural Modulus : 10.0GPa
- Compressive : 356MPa

Wear Resistance

- Modified Leinfelder-type wear:1.35mm³
- Vickers Hardness: 60Hv

Radiopacity

110% of Alminium

Thank you for your Attention !