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**Review Article**

# Omnichroma: The See-It -To-Believe -It Technology

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**Abstract:** Over the past several decades of the 20th and the 21st Centuries, there has been a lot of development in the field esthetic dentistry. OMNICHROMA a new promising product introduced into the market in the year 2019 by Tokuyama Dental. In this article, we would be looking into this material that could potentially change the trend of dentistry compared to the last two decades can have huge impact on esthetic dentistry.

**Keywords:** Smart chromatic technology, chemical color, structural color, OMNICHROMA blocker, macrofilled composites, microfilled composites, hybrid composites.



## INTRODUCTION

Restorative dentistry has shown much advancement in composite resins, adhesive technology and techniques since the last century. Earlier acrylic resins were used for esthetic restorations but they had many drawbacks like low abrasion resistance, poor color stability, high shrinkage and poor marginal seal. R Bowen, in 1962 developed a polymeric dental restorative material reinforced with quartz filler known as ‘composites resins. Composite is a three-dimensional compound composed of two or more chemically different materials with properties which are superior or intermediate to those of an individual constituent. Composite resins provide patients highly conservative and esthetic restorations due to substantial progress in the development and application in past two decades. Earlier composites were recommended only as a restorative material for anterior restorations, but now fillers coupled with acid etching and bonding to tooth structure made it useful for restoration of both anterior and posterior teeth. Today optimization of formulations, improvement in properties and new techniques for placement have made composite resins as an economical and esthetic alternative to other direct and indirect restorative materials [1].

## HISTORY

Macrofilled composites were developed in early 1970s. The first successful commercial composite resin was {Concise (3M) and Adaptic (Dentsply Sirona)}. They had large fillers with average particle sizes ranging from 0 to 5µm. The surface texture is rough due to large size and extreme hardness of filler particles which lead to wearing of occlusal contact area and plaque accumulation. There physical and mechanical strength is better than unfilled acrylic resins. They are indicated in stress bearing areas like Class I and II and large Class III and IV.

Microfilled composites in the 1980’s was introduced as Durafill VS (Kulzer) and Renamel (Cosmodent) with average particle size ranging from .04 to .4 micrometers [2]. Due to small particle size the surface texture is smooth and polished which is resistant to palque, debris and stain. These exhibited poor mechanical properties due to more matrix content, poor color stability and increased marginal breakdown. These are used in restoration of anterior teeth and cervical abfraction lesions.

Hybrids composites was developed in the 1990s. They were named so because organic phase is reinforced by an inorganic phase [3]. These hybrids were not easily polishable as they are made up of

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glasses of different compositions and sizes, with particle size of less than 2 µm and contains 0.04 µm sized fumed silica. It has excellent polishing and texturing properties, good abrasion and wear resistance and decreased polymerization shrinkage. They are indicated for anterior and posterior restorations due to their superior surface smoothness and good strength.

In 2000s newer formulations were brought into the market with increased esthetic characteristics. This was the first-time different shades have been allowed to imitate the natural tooth structure. The dental practitioners faced problems because these products are sold in kits and most of the time the entire kit ends up unused during the product's life span.

Nanofilled and nanohybrid composites were introduced just after; with average particle size less than that of microfilled composites (ranging from 5 to 75nm and nanocluster fillers (5 to 20nm) [3, 4]. This resulted in physical properties equivalent to the original hybrid composite resins and restorations with smoother finish and shine [5]. E.g., Tetric EvoCeram (Ivoclar Vivadent) and Filtek Supreme Plus (3M).

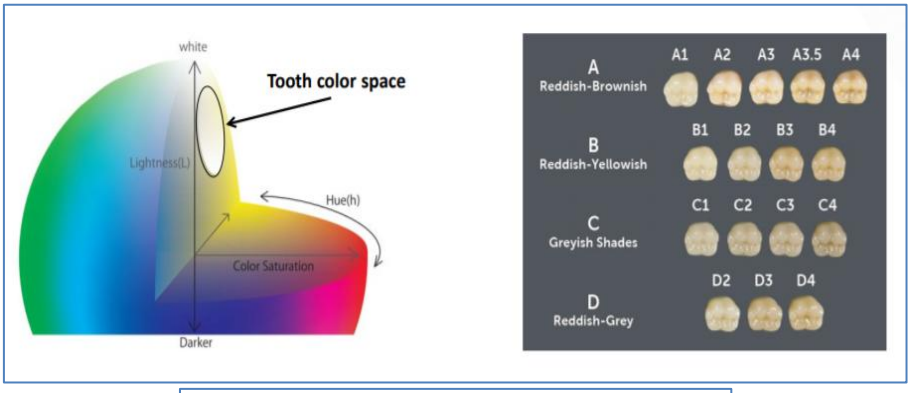
By the 2010s, Bulk-fill composites were developed which got acceptance by most dentists because of lesser polymerization shrinkage with a greater depth of cure up to 4mm [6]. The first flowable bulkfill composite was SureFil SDR Flow (Dentsply Sirona) but used as a base under restorations.

Newer bulkfill agents like Tetric EvoCeram Bulk Fill (Ivovlar Vivadent) and Estelite Bulk Flow (Tokuyama Dental America) does not require any other layer of composite as a capping. They have higher strength and esthetics but some can be translucent; which presented with its pros and cons depending on the restorations.

Some of the studies showed that composite suffers from extrinsic or intrinsic staining due to pigments in food or drinks or habits such as smoking. Whitening techniques for bleaching teeth served as solution towards a desired aesthetic. Bleaching can remove acquired stains on composites and return them to their original shade but it will not change the shade of composite restorations to a lighter color. Due to this, bleaching is usually recommended prior to receiving an anterior composite filling, so that the restoration is matched to the new, lighter tooth shade. As a solution to this problem, Tokuyama created a composite called OMNICHROMA in the year 2019.

**The revolution**

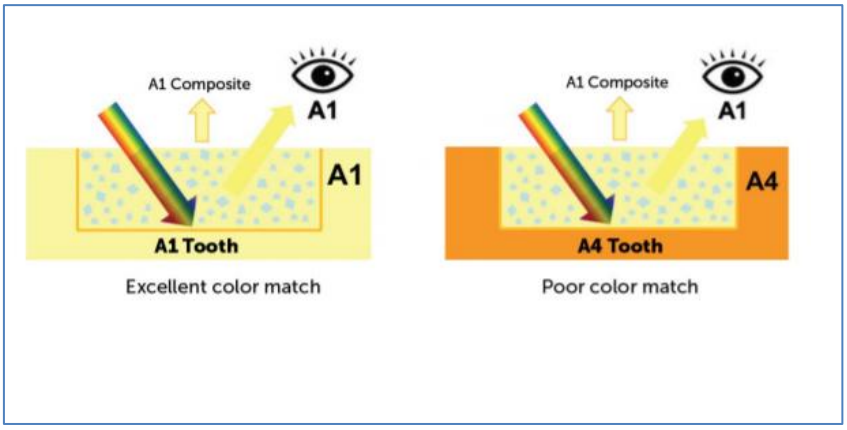
OMNICHROMA is a first shade matching composite which gained a lot of popularity recently. It poses a unique property which is based on "smart chromatic technology". It is able to capture the structural color of its surroundings which is achieved by controlling the size of its filler particles [7]. It has no added dyes or pigments and fillers themselves generate red-to-yellow structural, which combines the color of surrounding tooth. Color is the wavelength of light that reaches our eyes. Human teeth fall in the red-to-yellow color space.




There are two types of color producing phenomenon

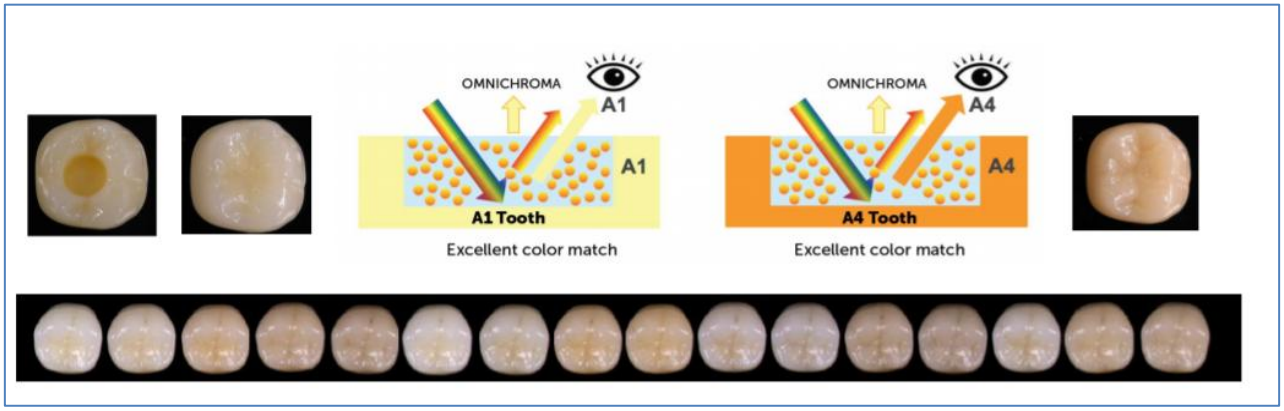
**1. Chemical color**

Molecules of the material reflect particular wavelengths. It is the most common form of color visible to us. Typical composites today rely on chemical color of added dyes and pigments.




**2. Structural color**

Structure of the material amplifies or weakens different wavelength and it is very rare. OMNICHROMA is the first one to use structural color in composite dentistry as the main color mechanism.

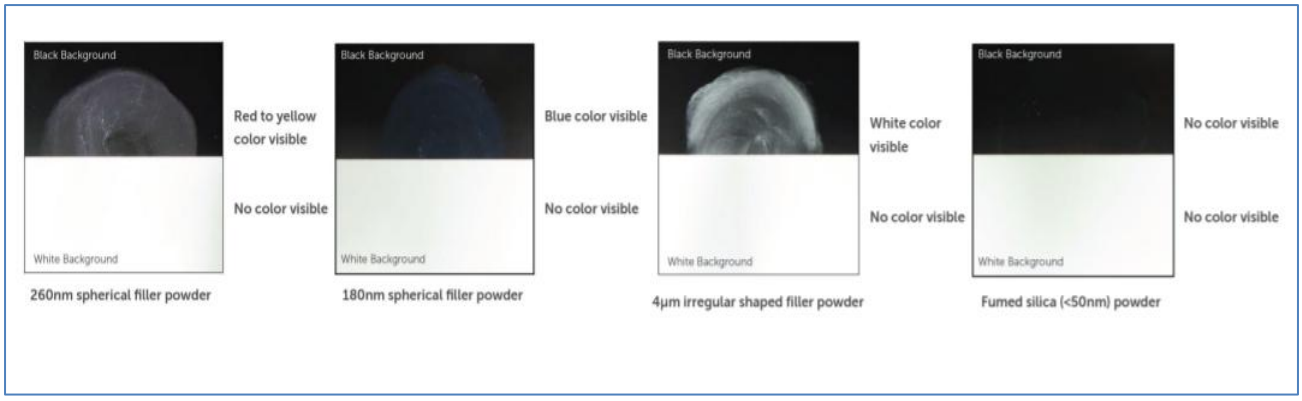



In study conducted by The University of Texas School of Dentistry at Houston the Visual Color Adjustment Potential (CAP-V) of resin composites among five shades was analyzed through visual evaluation [8]. OMNICHROMA exhibited the highest CAP-V, which showed smaller color difference between tooth surface and OMNICHROMA, so it is a better match on artificial denture teeth A1-D4.

Another study was conducted by Nihon University School of Dentistry analyzed the color-matching ability of OMNICHROMA and other resin composites. OMNICHROMA showed lower ΔE results which means superior ability in color matching as well as clinically acceptable.

**Relationship between particle size and structural color**

When it is spread out on black and white backgrounds, some filler materials can exhibit structural color. White light reflected by the white background is very strong, which is why a structural color phenomenon is not visible on white background**.**




**Components of OMNICHROMA**

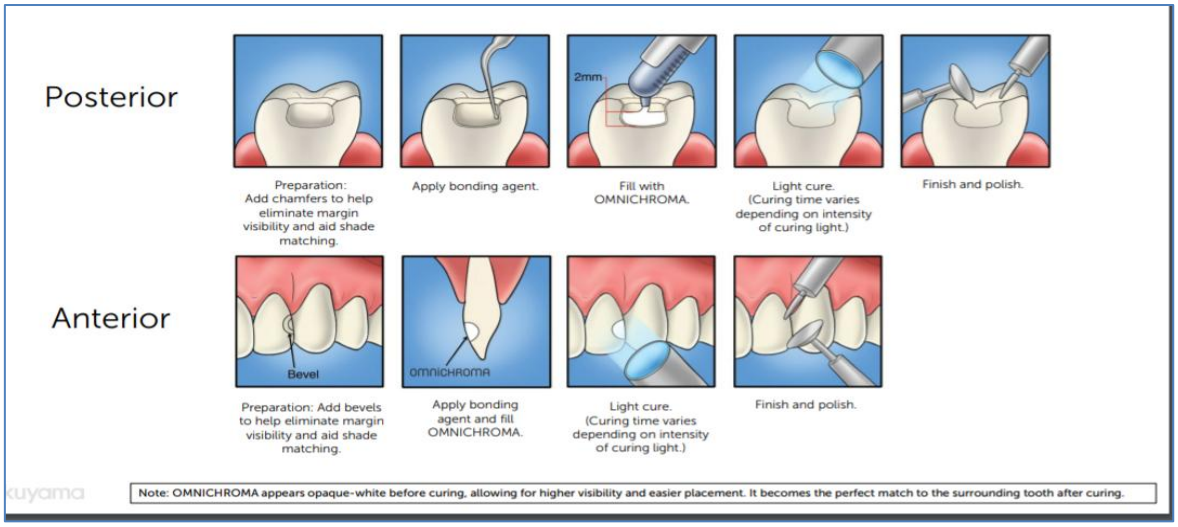
1. Fillers- uniform sized spherical shaped supra- nano spherical filler (260nm SiO2 -ZrO2) that are manufactured in absence of irregular edges. Which led to the development of concept of polychromatic composite
2. Monomers -UDMA/TEGDMA with filler loading 79wt% (68vol%).

**Feature and Indications**

It has unpredictable shade matching ability, shade matches before and after bleaching, high polishability and excellent physical- mechanical properties.

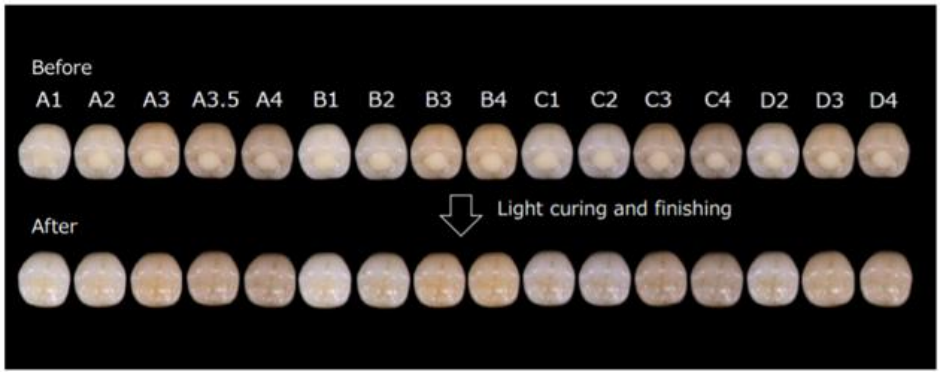
It is indicated for direct anterior and posterior restorations, direct bonded composite veneer, diastema closure and repair of porcelain/composite.

**Clinical Procedure**



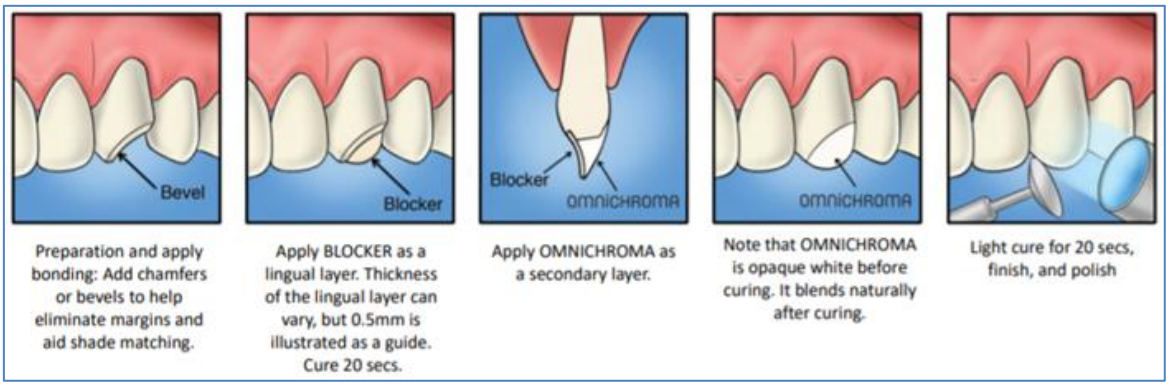

**Before and After**

It appears opaque -white before curing and then become the perfect match to the surrounding tooth after curing.



**Omnichroma blocker**

In case of large Class III and IV, shade matching interference may occur due to lack of surrounding dentition. OMNICHROMA blockers overcome this limitation by working as supplementary material to reduce shade matching interference. It is used as a lingual layer for large Class III or Class IV restorations with limited surrounding dentition. After applying and curing OMNICHROMA blocker, OMNICHROMA is applied as second layer.




**Properties of OMNICHROMA** [9]

- High polishablity
- The flexural strength is of average or higher levels among commercially available resin composites, ensuring clinically acceptable results.
- The compressive strength is higher than most commercially available resins
- It has lower wear and abrasion
- It exhibits lower polymerization shrinkage
- It has staining resistance (color stability)
- It offers ample working time for almost all restorative procedures
- The radiopacity is average and sufficient for prognosis and observations.

## CONCLUSION

Over the many decades of improving esthetic restorations, the clinicians globally have introduced many noteworthy composite restorations into practice However, OMNICHROMA a shade matching composite serves to be one of the most exciting developments in the recent years. Due to this dentist will be able to save money and time. So, in future more studies and follow-up of cases in the needs to be done in order to arrive at the final conclusion whether OMNICHROMA will live up to its promising expectations [9].

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