

New submicron composite BRILLIANT EverGlow from COLTENE – innovative approach to the restoration of teeth. Composite of the future – physical properties, clinical features.

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Since 1983, when according to the developments of professor Nabashyami the effective adhesive systems were implemented in clinical practice, the new era of adhesive methods has been started in restorative dentistry.

This period is rightly called the "composite revolution" by many researches. The wide-spread implementation of the adhesive technology gave a powerful impetus for the technological improvement of composite materials, which have almost completely replaced Amalgam and cements from the arsenal of practical work of dentists. Accordingly, the term "filling" was replaced by the term "direct composite restoration", the technique which was also constantly improved during the evolutionary development of composites. However, the abrupt development of composites, observed from mid-80s to mid-90s,

slowed down with the advent of fine-hybrid composites. And almost ten years to the mid-20s they completely dominated in the dental market and in the practice of dentists restorers. Many sources were suggested that from the physicochemical point of view all evolution was obtained from the composites and their further development is impractical and impossible. The main characteristic feature of these composites was their universal application. In the optical and aesthetic terms, most of them were very similar.

Since the mid-2000s with the development of nanotechnology, a new stage in the development of composite materials has been started. This stage is characterized by the appearance of nanofilling hybrid composites, the advent of pre-polymerization forms etc. JADA characterizes the current stage as "the second composite revolution".

In the Decade of the existence of nanohybrid materials, they constantly were improved – from the original size of the basic particles – 400-500 nm, they were declined to 50-100 nm. In 2015, the company Coltène/Whaledent AG (Switzerland) presented the composite BRILLIANT EverGlow (Fig. 1) with the base particle size of 20 nm.

In our opinion, the company is an example of the most methodical approach to solving the issue of training and adaptation practitioners to the most efficient color evaluation system and the optical parameters of dental hard tissue in aesthetic regard $L^*a^*b^*$ (1-6). The line of composites, proposed by this system, can be described as a smooth, step-by-step transition from classical, accessible and understandable to the majority of dentists VITA system to $L^*a^*b^*$ system of color evaluation of teeth and the



Fig. 1: Highly filled, radiopaque universal submicron hybrid composite BRILLIANT EverGlow

relevant building of the restoration. The micro filled hybrid SwisSTEC is located at the bottom of the line and can be presented as the VITA system. This composite can help to “catch” the material. The next in line is a nano-hybrid composite BRILLIANT NG ⁽²⁾, in which the company has pioneered the use of a system of “double” color Duo Shade. The base material for the “most widespread” restorations for the company is nano hybrid composite SYNERGY D6, which can be called a simplified MIRIS² version ⁽¹⁾.

MIRIS² is located on the top of the composite pyramid. It is the composite of the premium segment, which optically able to recover any clinical situation.

On the basis of SYNERGY D6 in 2011 the system of direct prepolymerized composite veneers COMPONEER has developed by the company, which had no analogues in the world at that time ⁽⁴⁾. Taking into account the wishes of practical dentistry, a unique submicron composite BRILLIANT EverGlow (Fig. 4)

was developed by the company in 2015, in which due to its unique manufacturing technology these problems have been eliminated. Physical properties of the new composite are presented in Table 1.

Optically, the composite is built on the principle of SYNERGY D6 using Duo Shade system and is available in the following colors: Universal, Translucent and Opaque (low translucent). Universal shades (Bleach, A1/B1, A2/B2, A3/D3, A3,5/B3, C2/C3 and A4/C4) represent an analogue of the

Properties	Unit	Protocol	Value
Filler content by weight	w-%	-	79
Filler content by volume	vol-%	-	64
Inorganic filler content by weight	w-%	-	74
Inorganic filler content by volume	vol-%	-	56
Range of inorganic filler size	nm	-	20-1'500
Flexural modulus	MPa	ISO 4049	8200
Flexural strength	MPa	ISO 4049	117
Compressive strength	MPa	internal method	390
Vickers hardness	kg/mm ²	internal method	55
Wear rate McCabe	-	internal method	2.2
Gloss retention after toothbrush abrasion	GU	internal method	67
Water sorption	µg/mm ³	ISO 4049	15.1
Water solubility	µg/mm ³	ISO 4049	<1
Polymerisation shrinkage Watts	%	internal method	2.3
Polymerisation shrinkage Archimedes	%	ISO 17304	2.8
Consistency Zwick	N	internal method	18.0
Stickiness to steel	N	internal method	41
Polymerisation depth	mm	ISO 4049	2.4
Radio opacity	mmAl	ISO 4049	2.0
Operating light resistance 60s@10'000lx	-	ISO 4049	pass
Operating light resistance @20'000lx	s	ISO 4049	50
Opalescence	-	internal method	21.0
Colour stability UV, delta E	-	internal method	0.76

Table 1: Physical properties of the submicron composite BRILLIANT EverGlow. The chemical composition of BRILLIANT EverGlow includes methacrylate, dental glass, amorphous silica and zinc oxide.

dentin masses SYNERGY D6. They are designed to:

- Direct restorations of the cavities of I, II, III, IV and V classes
- Filling and repair of composite and ceramic restorations (for example, COMPONEER)

Translucent shades of BRILLIANT EverGlow – Translucent (Trans) and Bleach Translucent (BL Trans) are also similar in the optical component with enamel masses SYNERGY D6. They are designed for:

- Correction of shape and color of restorations in order to improve individual aesthetics
- Restoration of cutting edges
- Filling and repair of composite and ceramic restorations (for example, COMPONEER)

Finally, undoubted a positive point was the creation of special opaque masses, which are produced in shades Opaque Bleach (OBL), Opaque A1 (OA1) and Opaque A3 (OA3).

They are intended for:

- Aesthetic correction (for example, in case of deviation of tone saturation)
- Masking discoloration areas
- Restoring the tooth stump from dentin mass.

While working with the BRILLIANT EverGlow all rules of pre-adhesive and adhesive preparation of the cavity are followed as with any other composite. There is a common protocol and for modeling composite of the cavity. Of course, with the appearance of any new material, especially declared as highly aesthetic, the main interest lies in the clinical examples of its use. During the period of October – December 2015 twenty-three restorations of anterior teeth were carried out. We were moving step by step from the most minimal optical disorders of dental hard tissues, where, respectively, the simplest technique of constructing of the restoration is presented, to the more complex, including the treatment of teeth after endodontic treatment and combined restorations (direct and indirect methods). The results of restoration are presented below.

Clinical case 1

Patient O., 29 years old

The patient complained of defects in the area of the cutting edge of the teeth 12 and 22, obtained as a result of acute mechanical injury (Fig. 2). After confirmation of a vitality of the teeth the direct composite restoration Brilliant EverGlow was carried out. Considering the fact that previously the teeth were exposed to whitening procedure, the universal mass A1/B1 was used for the restoration of the dentin. The dentin body of the restoration was restored by the frame of the universal mass Bleach in the area of the cutting edge of the dentine and incisal corners. The translucent mass Bleach Translucent restored the cutting edge and then the enamel. The result of the restoration is shown in Fig. 3.

Clinical case 2

Patient R., 19 years old

The patient is undergoing orthodontic treatment. Initial clinical situation is shown in Fig. 4. Caries media was diagnosed on the 12 and 22 teeth. Due to the necessity of the further orthodontic treatment



Fig. 2: Case 1 - Initial situation



Fig. 3: Case 1 - Final result



Fig. 4: Case 2 - Initial situation



Fig. 5: Case 2 - After preparation



Fig. 6: Case 2 - Final result



Fig. 7: Case 3 - Initial situation

the complete correction of the size and form of the incisors was considered inappropriate and postponed until the completion of the active treatment period and the onset of the retention period. The condition after preparation is presented in Fig. 5. The preparation was carried out in the most sparing regimen. For restoration of the dentin the universal masses A2/B2 were used as a "core" of restoration for creating the effect of "chromaticity". As basic dentin mass, the A1/B1 mass was used, and for the restoration of enamel, the translucent mass Bleach Translucent was used. General view after treatment is presented in Fig. 6.

**Clinical case 3
Patient L., 30 years old**

The case of the aesthetic correction of the congenital form of teeth discoloration. The patient had been living in area of the endemic fluorosis until she was 17 years old. The tooth 12 was previously endodontically treated. After the hygienic procedures, pre-whitening by the Beyond system and minimally invasive preparation in the upper third of the crowns of the teeth 12 and 22 the opaque layer A1 was placed with a thickness of 0.2 – 0.3 mm.

The universal mass Bleach was applied to the lower 2/3 third of the crowns. Then the opaque layer was covered by the universal mass A2/B2. The translucent mass Translucent was used for restoration of the enamel. The teeth 13 and 23 were covered by universal mass A3/D3 in the upper third of the crown and by universal mass A2/B2 – in the lower 2/3 of the crown. The enamel was restored with use of the translucent mass. Initial clinical situation and the result of the restoration are shown in Fig. 7 – 8 respectively.

**Clinical case 4
Patient, 36 years old**

The case of the one-step restoration due to treatment of caries of the teeth 12 and 22 teeth and correction of the form of the tooth 22. Initial clinical situation is shown in Fig. 9. The restoration was carried out by the protocol described in the previous clinical case using the same shades and material mass (Fig. 10).

**Clinical case 5
Patient Y., 52 years old**

Initial clinical situation is shown in Fig. 11. After planning of the treatment and color match of restoration the prior tooth

whitening was carried out by the Beyond system. Then the direct composite restoration of the teeth 11 and 12 was carried out. The view of the operative field is presented in Fig. 12. The initial color after the bleaching procedure was A2. Tooth 12 was previously endodontically treated. The view of the restored tooth after preparation and re-endodontic treatment is shown in Fig. 13. The mass Opaque A3 (OA3) with the thickness of layer 0,2mm was applied to the upper third of the crown of the 12 tooth in the cervical region. The mass Opaque A1 (OA1) with the thickness of layer 0,1 mm was applied to the lower 2/3 of the crown. The tooth 11 was restored without the use of opaque masses. Dentin body was restored by the method of L. Vanini repeatedly described in our previous works^(3,6). Universal masses A3.5/B3, A3/ D3 and A2/B2 were used for the tooth 21 and A3/D3, A2/B2 for the tooth 11. After this, the "contouring" of the cutting edge was conducted by the Bleach mass, and then as the main enamel, the Translucent mass was used for coronal part and the Bleach Translucent mass was used for a cutting edge. There were no pores in the material after restoration.



Fig. 8: Case 3 - Final result



Fig. 9: Case 4 - Initial situation



Fig. 10: Case 4 - Final result



Fig. 11: Case 5 - Initial situation



Fig. 12: Case 5 - After bleaching



Fig. 13: Case 5 - After preparation

The restoration had a gloss even before the polishing. The completed view of the restoration after standard polishing with DIATECH SwissFlex is shown in Fig. 14. The view of the teeth after 30 days of the restoration is presented in Fig. 15.

Clinical case 6

Patient B., 25 years old

Initial clinical situation is shown in Fig. 16. After preliminary procedure of the whitening, the direct composite restoration was carried out according to the anatomical and morphological method using the almost complete color palette BRILLIANT EverGlow except for A4/C4. At the same time the correction of anatomical form and dentition was carried out. The result of restoration under the different lighting conditions

was presented in Fig. 17–18. Due to the presence of the injury of the gingival margin the polishing procedure was delayed for 7 days prior to stabilization of marginal paradontium. The condition after 30 days of the treatment is presented in Fig. 19.

Clinical case 7

Patient A., 28 years old

Tooth 12 was extracted in case of trauma (Fig. 20). In this clinical case, it is necessary to point out the concordance of optical characteristics between direct composite restoration of the teeth 11 and 22, made of submicron composite BRILLIANT EverGlow, and indirect restoration of 12 tooth, made of glass-ceramic e.max. (Fig. 21).

It should be noted that we frequently used the whitening procedure before the restoration (in case of the restoration of devitalized teeth – 100%). According to our clinical experience, prior teeth whitening greatly simplifies the task of construction the restoration. In addition, the anti-aging effect of the treatment should not be discounted. This effect is an important value for aesthetics of restoration, especially if we take into account the fact, that all of our patients were women. The beyond system was used before the restorations. This system has a less pronounced whitening effect compared to, for example, a zoom system. However, this beyond system has a major advantage over all methods – it practically does not cause hypersensitivity of dental hard tissues, so it is possible to begin the



Fig. 14: Case 5 - Final result



Fig. 15: Case 5 - Final result after 30 days



Fig. 16: Case 6 - Initial situation



Fig. 17: Case 6 - Final result



Fig. 18: Case 6 - Final result



Fig. 19: Case 6 - Final result after 30 days



Fig. 20: Case 7 - Initial situation



Fig. 21: Case 7 - Concordance of optical characteristics between BRILLIANT EverGlow (11, 22) and glass-ceramic e.max (21).

restoration immediately after the session. Thus, by accumulating some experience with the new universal submicron composite BRILLIANT EverGlow, it is necessary to point out the special characteristics, which certainly must be considered in its practical application:

- According to the color scheme BRILLIANT EverGlow is created on the principle of the successful SYNERGY D6
- Presence of opaque system significantly expands the clinical capabilities of the represented composite not only in comparison with SYNERGY D6, but even with MIRIS²
- BRILLIANT EverGlow, due to the unique physical features, has excellent “initial adhesion”, plasticity during the modeling of restoration, “sculptural” (i.e. the ability to hold the form)
- Material is easily polished even by the standard polishing composites systems, while the gloss is maintained stable even after long-term clinical control after treatment and can be described as the effect of «dry shine»;

■ Due to the presence of composite masses with different transparency and Shade Duo System, the composite has excellent color rendering properties, allowing successfully solve almost any clinical problems of aesthetics of the dental hard tissues including teeth restoration of previously endodontically treated teeth.

It is very important to emphasize the high efficiency of composite during the combined restorations in conjunction with the nonmetal ceramics. It is necessary to continue clinical researches especially the analysis of long-term results after treatment for obtaining the full characteristics of the material. But even now, it is well known, that Brilliant EverGlow is a highly effective composite for solving any clinical situation including the ceramics correction. This material has the properties and characteristics that we perceive as the concept of “true Swiss quality”.

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