

## The structure, composition and visual opacity of some dental composite resins

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**INTRODUCTION:** The continuous effort of both researchers and producers in the field of dental restorative materials to improve their properties as well as their clinical success rate is revealed by the constant changes of the filler in the composite resin. The modern fillers included in the latest materials are based on radioopaque elements which allow the dentist to detect secondary caries, but also influence the optic properties, thus the esthetic result of these restorative materials. [1-2] The purpose of this study was to evaluate and compare the structure, composition and visual opacity (translucence) for commercial dental materials.

**MATERIALS & METHODS:** We have studied six commercial composite resins containing irregular-shaped fillers as experimental materials. Table 1. Composite resins examined in this study

Materials	Manufacturer
Tetric Ceram(C1)	Vivadent Schaan, Liechtenstein
Composite autohton (C2)	Remed Prodimpex, Cluj-Napoca Romania
Spectrum (C3)	Dentsply De Trey, Konstanz, Germany
Charisma (C4)	Kulzer, Friedrichsdorf, Germany
Solitaire 2 (C5)	Heraeus Kulzer, Wehrheim, Germany
Compoglass (C6)	Vivadent Schaan, Liechtenstein

**Characterization of the composite resins** The composition and structure of the six materials were examined using a Philips L 20 scanning electron microscope. Specimens for scanning electron microscope (SEM) observation of the ground surface texture were prepared by filling composite resins into a Teflon mould (6 mm width, 3 mm thickness) and were kept in distilled water at 37°C for 24 hours. Other specimens were prepared in disc-shaped Teflon moulds (2 mm thickness) for measuring the translucency of the composite resins by spectral investigations UV-VIS using a spectrophotometer type UNICAM 4 UV-VIS (574 nm and 800 nm).

**RESULTS & DISCUSSION:** The photographs taken under the microscope showed that the studied composite resins have a similar microstructure, the variations between the six investigated commercial composites are not significant. We have observed a very homogeneous structure at the C4 composite resin, filled with Ba-Al-Si glass, with some bigger size particles with sharp edges. The presence of SiO<sub>2</sub> in the C4 showed us the filler size varies between 0.01-0.07 µm and 0.04 µm. The qualitative analysis

of the studied materials has revealed the presence of the ions Ba, Ca, Al, Si, Zn thus proving the composition that was considered when they were produced. From the SEM observations we have concluded that all six materials have the filler particles dispersed. These materials have a constant distribution of the particles, while other composite resins have a filler distribution in a wider specter, which leads to improves characteristics regarding consistence and plasticity. The translucence may vary upon the specific applications of the dental restorative materials. Our study has evaluated the translucency of all the six composite resins in order to determine the effect of the chemical composition of the resins upon their translucence. The results showed the changes in the transmittance along with the increase of the wave length. The values of the transmittance for the tested materials under 2 wave lengths on white and black background are resumed in Figure 1.

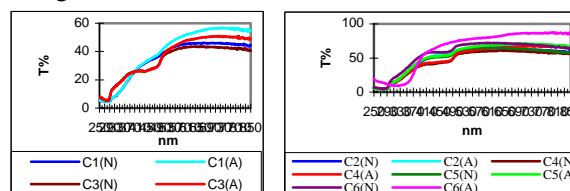


Figure 1. Spectra UV-VIS for dental composites

The resins containing Ba glass particles or a mixture of Ba and Ytterbium glass have lower values of the transmittance as compared to those with Zn glass filler.

**CONCLUSIONS:** The numerous combinations between different glass fillers are not able to completely satisfy all the requests of a dental restorative material. Our results suggest that the elaboration of a new dental material must first of all clarify the properties that we want to obtain. Thus for the restorations where esthetics is a priority in the anterior teeth we will use more translucent composite resins to match with the high translucency to the enamel; for the restorations in the posterior teeth where the resin must match the dentine we will use more opaque materials. The different values for the investigated composite resins are able to cover all the clinical applications of these materials.

**REFERENCES:** <sup>1</sup>Akerboom H.B., Kreulen CM., (1993), *J Prosthet Dent*, Oct, **70**:351. <sup>2</sup>F.Lutz, R.Phillips, (1984), *J. Dent. Res.*, **63**:914.