SCIENTIFIC REPORT

Admira Fusion – The effect of UV light on the colouring of ORMOCER- and methacrylate-based restorative materials

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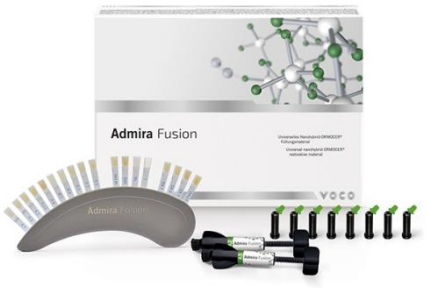

With Admira Fusion, VOCO presents the first purely ceramic-based restorative material on the dental market. The product combines two outstanding innovations: nanohybrid and ORMOCER technology. Admira Fusion has an impressively low polymerisation shrinkage of just 1.25 % by volume and low shrinkage stress. Excellent biocompatibility is another outstanding property. Admira Fusion is based on pure silicate technology, i.e., all the components of the material are silicate based. Even the resin component, the ORMOCER resin, is characterised by a highly cross-linked silicate backbone, which made it possible to avoid the use of conventional monomers completely. The restorative material is inert and thus also extremely resistant to discolouration. Prof. Torres et al. at the University of São José dos Campos in Brazil conducted a study into the discolouration of different restorative materials following artificial irradiation with UV light.[1]

Aim of the study

The aim of the study was to analyse the shade of different restorative materials following artificial ageing by means of UV light. In addition to the nano composites and nanohybrid composites Filtek Z350 XT (3M ESPE), TPH3 (Dentsply) and GrandioSO (VOCO) the nanohybrid ORMOCER restorative material Admira Fusion (VOCO) was also investigated.

Study design

A total of 60 test specimens (discs) were prepared with a layer thickness of 1 mm and a diameter of 6 mm. 15 test specimens respectively were produced using each of the restorative materials given in Table 1. The test specimens were immersed in water for 24 hours and their surfaces then polished with 1,200, 2,400 and 4,000 grit silicium carbide sandpaper. 15 test specimens made of enamel (bovine anterior teeth) with identical measurements and polished using the same methods as for the restorative materials were used as a control group. The initial shade value of the test specimens was determined with a spectrophotometer (CM-2600d, Konica Minolta) with the test specimens positioned in front of a white background. All the test specimens were then stored in artificial saliva and irradiated with a UV instrument (SUNTEST CPS+, Atlas) for the process of artificial ageing[2]. The accelerated ageing simulates one year of clinical use at a total of 300 hours. The temperature was kept consistent at 37 °C, the irradiation intensity at 765 W/m^2. Once the shade of the test specimens had been measured again, the absolute discolourations (ΔE) were calculated, see Figure 1.

Table 1: Restorative materials used

Material	Manufacturer	Material class	Resin matrix
Filtek Z350 XT	3M ESPE	Nano composite	Classic methacrylate resins
TPH3	Dentsply	Nanohybrid composite	Classic methacrylate resins
GrandioSO	VOCO	Nanohybrid composite	Classic methacrylate resins
Admira Fusion	VOCO	Nanohybrid composite	ORMOCER resin

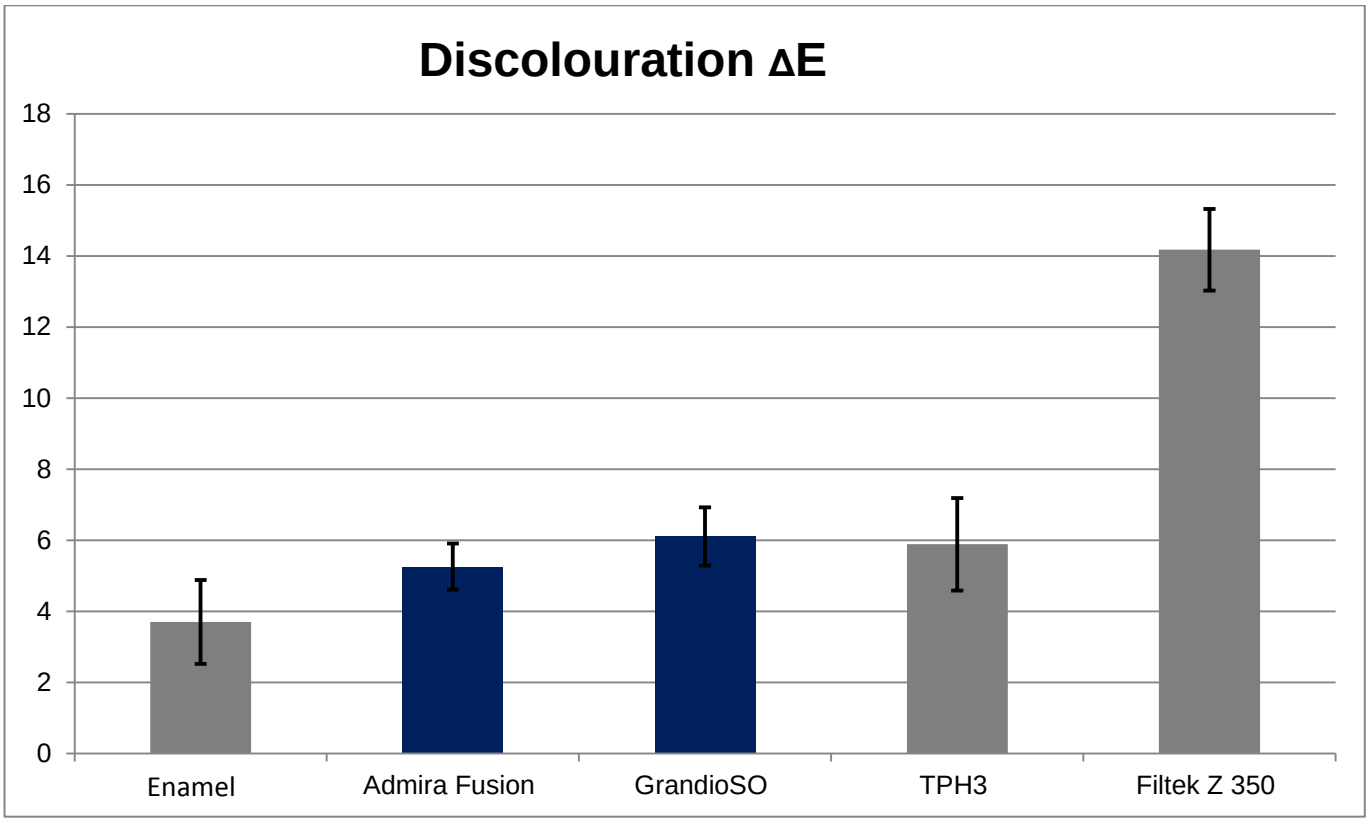

Figure 1: Discolouration ΔE following artificial ageing with UV light

Results

All of the tested restorative materials displayed discolourations following artificial ageing with UV light. All of the materials also displayed more severe discolouration than the enamel. Admira Fusion demonstrated a similarly low discolouration to the nanohybrid composites GrandioSO and TPH3. The nano composite Filtek Z350XT displayed the most significant discolouration among the materials tested.

Conclusion: Admira Fusion displays only slightly higher discolouration following ageing with UV light than enamel. The ORMOCER-based restorative material does not show any significant differences from the long-established restorative composites GrandioSO and TPH3.

[1] Torres CRG et. Al, Poster, Academy of Dental Materials Annual Meeting 2016, Chicago, USA.
[2] ISO 7491.