

## Charisma® Diamond

Strength testing – Tokyo Medical and Dental University, Japan  
Comparative evaluation of mechanical characteristics of nano-filler containing resin composites.

A filling material needs to resist high mastication forces especially when used in the posterior region. Secondary caries and fracture are still the main failures for restorative materials<sup>1</sup>. Composite materials for posterior restorations need to resist at least a flexural strength of 80 MPa according to ISO 4049. This is in particular important for thin layers or overhanging areas. Human dentine shows a compressive strength of approx. 300 MPa<sup>2</sup>. Therefore, a composite material should need at least a comparable or exceeding value to withstand the chewing forces. It is mandatory that such a material needs to have excellent mechanical properties for durable results.

The nano-hybrid composite Charisma Diamond demonstrated in the following study excellent mechanical values which is a pre-condition for long term survival in the oral cavity.

Giving a hand to oral health.



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MITSUI CHEMICALS GROUP

<sup>1</sup> Bernardo M, Luis H, Martin MD, Leroux BG, Rue T, Leitão J, DeRouen TA: Survival and reasons for failure of amalgam versus composite posterior restorations placed in a randomized clinical trial. JADA, 2007, 138 (6): 775-783.

<sup>2</sup> Watts DC, El Mowafy OM, Grant AA: Temperature-dependence of Compressive Properties of Human Dentin. J Dent Res, 1987, 66: 29-32.

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## Comparative evaluation of mechanical characteristics of nano-filler containing resin composites.

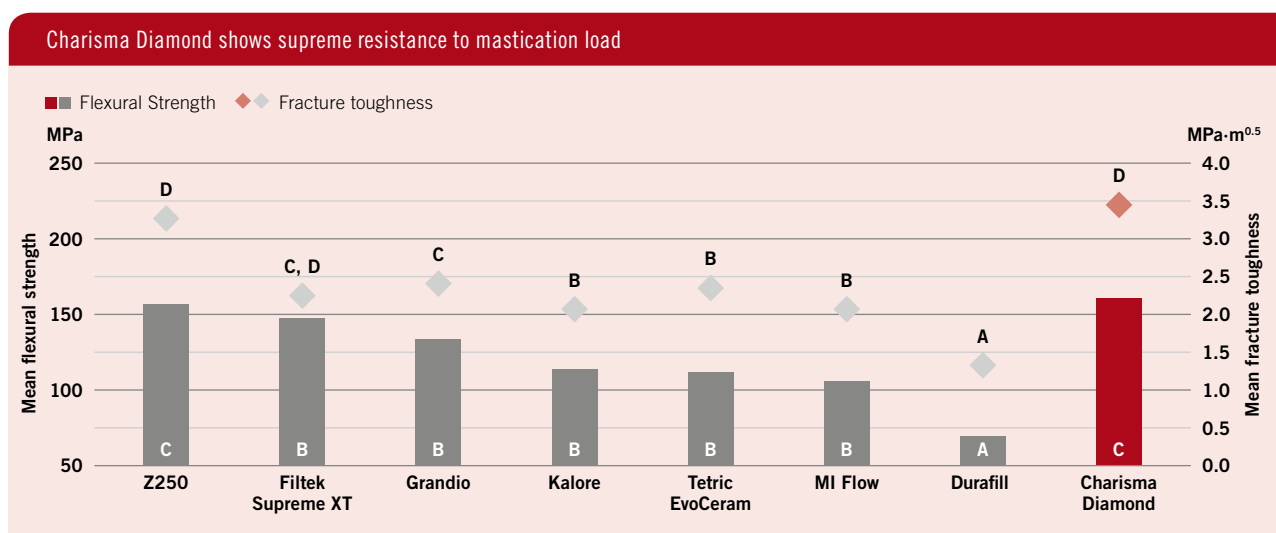
### Objective

Purpose of this investigation was the determination of basic mechanical characteristics of six commercially available nano-filler containing resin composites compared to a micro-hybrid and a micro-filled reference material. The tested hypothesis was that there are no differences in terms of the mechanical properties between the materials.

### Materials and Methods

Durafill VS (Kulzer) and Filtek Z250 (3M ESPE) were used as micro filled and micro hybrid references. The nano filler containing products were: Filtek Supreme XT (3M ESPE), Grandio (Voco), Kalore (GC), MI Flow (GC), Tetric EvoCeram (Ivoclar Vivadent), and Charisma Diamond (Kulzer). The following material characteristics were determined after 24 hours water storage of the specimens (n = 6): Flexural strength, yield stress (0.02 %) and modulus, tensile strength, and modulus, diametral tensile strength, Knoop hardness, and fracture toughness.

### Results



No significant differences between specimens with same letters were found. Charisma Diamond achieved a tensile strength of 74.36 MPa, a yield stress of 78.48 MPa, flexural modulus of 10.924 GPa, tensile modulus of 10.539 GPa, diametral tensile strength of 58.82 MPa and a Knoop hardness of 41.62 kgf/mm<sup>2</sup>. Charisma Diamond achieved excellent mechanical results. Particularly flexural strength and fracture toughness were superior compared with the other tested composites.

### Conclusion

The nano-filled Filtek Supreme XT and the nano-hybrids Grandio and Charisma Diamond show mechanical properties very similar to the micro hybrid Z250 and can thus be used for the same universal clinical indications, whereas MI Flow and the prepolymer loaded Kalore and Tetric EvoCeram should be used more restrictedly for restoration of posterior teeth.

### Source

Takahashi H, Finger WJ, Endo T, Kanehira M, Koottathape N, Balkenhol M, Komatsu M: Comparative evaluation of mechanical characteristics of nanofiller containing resin composites. Am J Dent 2011; 24:264-270.

The study was abbreviated and summarised and all diagrams and titles have been established by Kulzer.

Charisma Diamond is chemically equivalent to the originally evaluated composite. Charisma is a trademark of Kulzer.