



# Research Week 2020

## Alternative low stress diurethane dimethacrylate for BisGMA-free resin composites

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### Abstract

#### Objective

The aim of this study is to test BisGMA-free systems using newly synthesized diurethane dimethacrylates (2EMATE-BDI) as the base monomers for resin composites.

#### Methods

2EMATE-BDI or TEGDMA were copolymerized with UDMA at 40/60 and 60/40 mass ratio. BisGMA-TEGDMA at 60/40 mass ratio served as control. 0.2wt% DMPA and 0.4wt% DPI-PF6 were used as initiators. Inorganic filler particles were incorporated at 70wt%. Photocuring procedures were accomplished with a mercury arc lamp (320-500nm, 800mW/cm<sup>2</sup>). Composites were tested for kinetics of polymerization, polymerization stress, 3-point bending test, water stability and *S. mutans* biofilm formation. Data were analysed with one-way ANOVA/Tukey's test and Student's T test (95%).

#### Results

In general, in comparison to BT, formulations containing 2EMATE-BDI showed significant reduction in R<sub>P</sub>MAX, and slight reduction in final DC. The polymerization stress for the 2EMATE-BDI-containing materials was 30% and 50% lower than BT and analog TEGDMA-containing formulations, respectively. This can be only partially explained by the lower conversion (less than 10% reduction). Flexural strength were similar for all groups after storage in water. The moduli of the 2EMATE-BDI-containing materials were equal or higher than the TEGDMA-containing materials. The incorporation of 60wt% 2EMATE-BDI increased the hydrophobicity in 38% in comparison to BT. Biofilm formation was similar among the tested groups, which may also indicate equivalent biocompatibility.

#### Conclusion

The stark reduction in polymerization stress associated to the marked hydrophobicity without compromising mechanical properties and handling characteristics validates the

use of the newly synthesized 2EMATE-BDI monomer as diluent for BisGMA-free dental resin composites.

