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## Introduction and Objectives

Camphorquinone (CQ) and tertiary amine *N,N*-Dimethyl-*p*-toluidine (DMPT) are traditionally used to initiate polymerisation in bisGMA/TEGDMA dental composites. There are, however, toxicity and low monomer conversion concerns respectively with DMPT and bisGMA/TEGDMA. Furthermore, higher level of CQ can cause material yellowing. An amine with a methacrylate group (eg NTGGMA) has the potential to cause less toxicity due to being bound in the polymer matrix. UDMA and PPGDMA monomers have flexible backbone structures that can enhance conversion. Therefore, in this study, polymerisation of UDMA/PPGDMA composites with varying CQ and NTGGMA levels is assessed.

## Methods and Materials

CQ at 0.5 and 1 wt% of monomer phase was mixed with Urethane Dimethacrylate (UDMA) and Poly(propylene glycol) dimethacrylate (PPGDMA) monomers. The tertiary amine *N*-tolyglycine glycidyl methacrylate sodium salt (NTGGMA) was added into the monomer phase at 0, 0.5 or 1 wt%. This was mixed with dental glass powder at a powder / liquid ratio of 4. The monomer conversion (MC) of the pastes was calculated from FTIR spectra upon 20s light exposure using Demi<sup>Plus</sup> light source.

## Results and Discussion

MC of 65% and 75% in the absence of co-initiator at CQ concentration of 0.5 and 1 wt.% was achieved (figure 1). Addition of 0.5 wt% NTGGMA with 0.5 wt% CQ increased MC by 15% whilst 1 wt% NTGGMA addition with 1 wt% CQ had no effect.

This illustrates that UDMA/PPGDMA monomers can be cured without co-initiator if the CQ is sufficiently high. This may be due to the presence of secondary amine groups in UDMA which could act as a co-initiator. The MCs in this study are much higher than typically observed in bisGMA / TEGDMA based composites.

Biaxial flexural properties were also measured and demonstrated in figure 2 and 3. It illustrates that effect of NTGGMA and level of CQ on mechanical property is negligible.

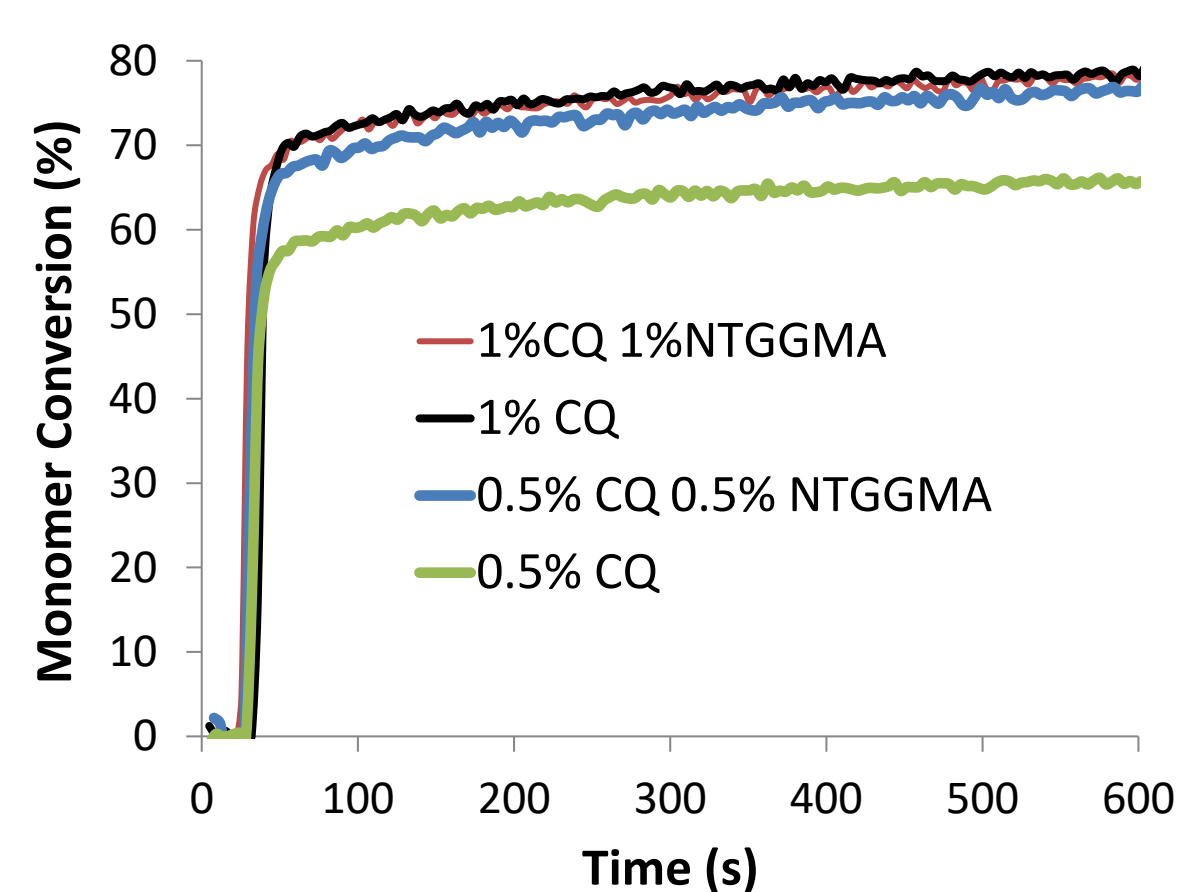


Figure.1: Monomer Conversion

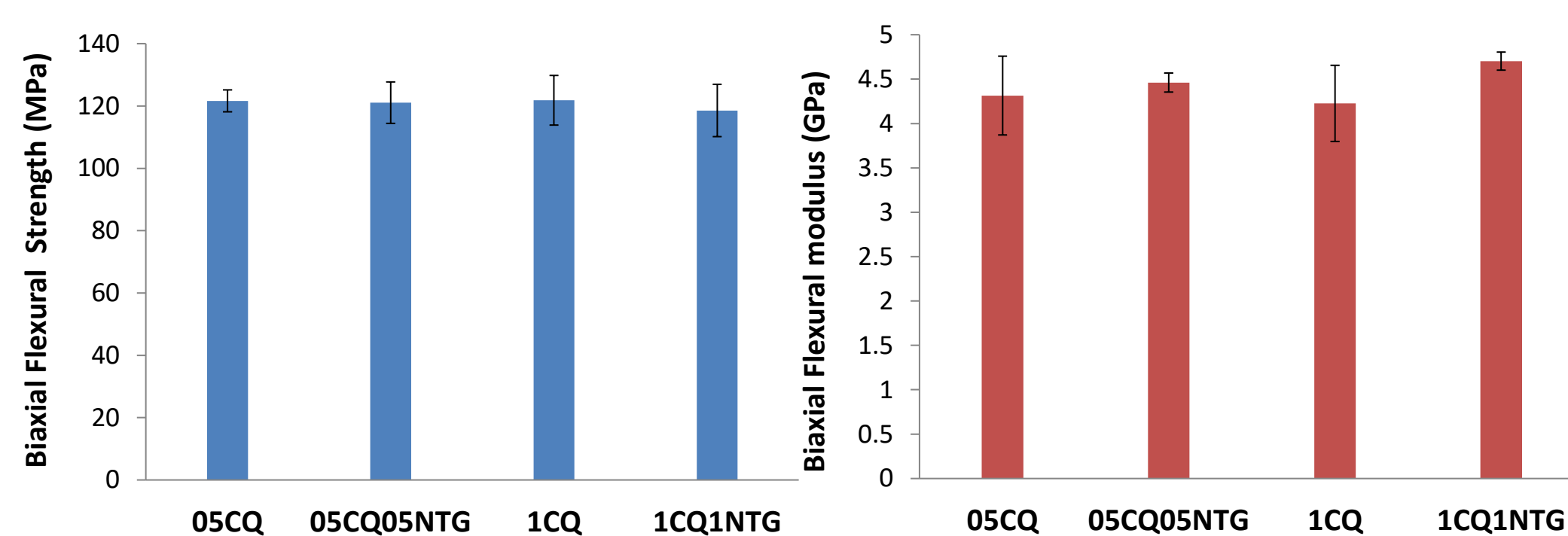


Figure 2: Biaxial strength

Figure 3: Biaxial modulus

## Conclusions

Higher monomer conversion can be achieved with UDMA/PPGDMA based dental composites, thus eliminating risk of toxicity from monomer release. The monomers can be polymerised in absence of co-initiators which suggests that UDMA has the function of initiation due to presence of secondary amine groups. NTGGMA can improve monomer conversion when low CQ level is required to reduce yellowing effect.

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