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Modification of polymethyl methacrylate by a palm oil-based macromer

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A palm oil-based macromer, FA35, was synthesized from palm kernel oil and used for modifying the polymethyl methacrylate (PMMA), in attempt to enhance the properties of PMMA as a denture base polymer. This study is divided into two stages: (i) Copolymerization and characterization, (ii) Evaluation of the copolymers for dental application. Copolymerization of FA35 and MMA was carried out by bulk process using benzoyl peroxide as initiator. This process was carried out initially at 60-70°C to produce the pre-polymer syrup, which was then cured overnight. FTIR and thermal characterization of the copolymers confirmed that they contained repeating units from both FA35 and MMA. Addition of crosslinking agents did not significantly affect the Tg of the copolymers. DSC analysis showed both co-monomers were compatible since only one Tg was observed for the copolymer. Copolymers containing up to 20% w/w of FA35 units show significantly lower water sorption than 100% PMMA. In addition, solubility of crosslinked copolymer was relatively low and comparable to that of the commercial resin. Mechanical test revealed that incorporation 5-10% w/w of FA35 into PMMA has improved the impact and flexural strength. However, addition of FA35 beyond 15% w/w progressively lowered the mechanical strength of copolymers.