J Material Sci Eng 2018, Volume: 7
DOI: 10.4172/2169-0022-C3-098

Synthesis and characterization of dental light-cured composites based on modified organic resins and nanofillers

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Restoring both anterior and posterior teeth with resin-composite materials is now an established clinical procedure. Dental composites are popular in the field of dentistry due to superior aesthetics, mechanical and physical properties. The current project has been divided in two parts firstly nanofiller (hydroxyapatite) was modified with gamma-(Methacryloyloxy)propyl] trimethoxysilane (γ MPS), by silanization process. The particle size, pore width and morphological status of nanofillers were found out by XRD, BET and SEM studies respectively. In the second part hyperbranched aliphatic polyester were methacrylated and were used to formulate dental composites by photopolymerization in presence of camphorquinone (CQ) as photoinitiator, dimethylaminoethyl methacrylate (DMEM) as coinitiator along with bisphenol A glycidyl methacrylate (BisGMA) and triethyleneglycol-dimethacrylate (TEGDMA) in 70:30 ratio. The concentration of methyl methacrylate varied in the resin mixture and its effect on different properties like degree of conversion, polymerization shrinkage, mechanical (micro Vickers hardness, compressive and flexural strength) were investigated. All these formulated resins, with partly methacrylated hyperbracnched polymer H20, have much higher double bond conversion and less linear polymerization shrinkage. High molecular weight multi-methacrylates have been considered as one of the most promising resin systems to reduce the shrinkage and improve the mechanical strengths of dental restorative composites. Thus, it can be concluded that these composites can be used in dentistry to produce promising effects.

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