

ally, the filler particles are treated with the silane coupling agent prior to blending the filler and liquid polymerizable matrix or it can be added to the polymerizable resin binder prior to addition of the inorganic particulate filler.

The dental restorative composite composition can be prepared, for example, by mixing each of the ingredients in any conventional manner, although a preferred packaging system is that disclosed, for example, in U.S. Pat. No. 3,926,906 to Lee, Jr., et al. According to the so-called two package system described in this patent, each package contains the unpolymerized monomers and any reactive diluents and inorganic filler and additive, preferably in the proportion present in the final product. One package contains the initiator or catalyst and the other package contains the reductant or accelerator. By combining roughly equal portions from the two packages, the catalyst and accelerator in each package react with each other to generate free radicals, thereby causing polymerization of the polymerizable resin system.

The composite resin composition can also be blended, prior to curing, with pigments or dyestuffs in amounts required to more closely approximate, in the cured composite material, the natural color of the tooth enamel, with which the composite material is being used. Examples of suitable pigments or dyestuffs include, for example, iron oxide black, cadmium yellow, cadmium orange, fluorescent zinc oxides, titanium dioxide, etc.

The following non-limiting illustrative examples will further demonstrate the practice of this invention.

EXAMPLE 1

Dental restorative composites were prepared by first blending (a) 25% by weight of an organic binder containing a 1:1 by weight mixture of bis-phenol A-glycidyl methacrylate product (BIS-GMA)-hexamethylenedimethacrylate mixture containing 5% by weight, based on the total monomers, of silane coupling agent (3-methacryloxypropyl trimethoxysilane) and 1% by weight, based on the total monomers, of acetylthiourea reductant; and (b) 75% by weight of filler. In Sample No. 1, the filler was 100% IMSIL A-10 (amorphous silica having an average particle size of about 2 microns), and in Run No. 2, the filler consisted of 98% by weight of the silica and 2% by weight of Teflon powder of submicron mean average particle size. The resultant pastes were treated with cumene hydroperoxide in an amount of about 2% by weight based on the total monomers, and cured in cups or molds. The composite resin was cured in about 3 minutes at room temperature. The cured composites were tested for their wear or abrasion characteristics on a sliding wear machine, in comparison with a commercial amalgam.

The sliding wear test machine permits measurement of the depth of the wear track with time caused by a

stylus of human enamel pressed against a rotating disc of the material tested. The pressure of the stylus and the speed of rotation are equivalent to the stress and strain occurring in human mastication. The apparatus is fully described in the 1977 PhD thesis, "Wear and Degradation of Polymers and Polymeric Composite Materials", submitted to the University of Connecticut by Paresh J. Sheth and is available from that school. This machine has been found to rank material with respect to wear in the same order as found by clinical studies. Commercial dental restorative composites were found to be markedly inferior to amalgams in wear abrasion against human enamel in results obtained with this sliding wear tester.

The wear data was summarized and compared with a commercial amalgam (Velvaloy, a product of S. S. White & Company) in the following table.

TABLE I

WEAR OR EXPERIMENTAL COMPOSITES		
Sample	Time to reach to 50 microns depth (hrs)	Wear depth after 50 hrs. (microns)
Amalgam	90	17.5
1. IMSIL A-10	43	60
2. IMSIL A-10 + Teflon	150 (est.)*	5

*The time to reach 50 microns depth is only estimated in this table since with the composite containing Teflon, the wear test was terminated at 120 hours, when the wear depth was only about 38 microns.

It is therefore seen from the above table, that addition of the Teflon powder to a silica filled composite which wears much more rapidly than conventional amalgam results in a filled composite that has greater wear or abrasion resistance than amalgam.

What is claimed is:

1. In a dental restorative composition having improved resistance to abrasion comprising from about 50 to 90 parts by weight of finely divided filler particles, and about 10 to about 50 parts by weight of liquid polymerizable organic resin binder, the improvement wherein about 1% to about 10% by weight of the filler is selected from the group consisting of polyfluorocarbon resin and polyfluorochlorocarbon resin.

2. The dental restorative composite composition of claim 1 which includes from 65 to 85 parts by weight of finely divided inorganic filler and 35 to 15 parts by weight of the liquid polymerizable organic resin binder.

3. The dental restorative composition of claim 1 wherein said resin is polytetrafluoroethylene.

4. A dental restorative composition of claim 1 wherein the resin comprises from about 1% to about 5% by weight of the filler.

5. The dental restorative composition of claim 1 wherein said total filler comprises 95 to 99% by weight of amorphous silica and 1 to 5% by weight of polytetrafluoroethylene.

* * * * *