g of a benzoin dimethylketal (Irgacure 651 TM -Ciba-Geigy).

7.5 g of the treated filler was mixed with 3.2 g of the acrylic resin and 0.8 g of additional silane resin; the resulting blend was degased under vacuum. A 2 mm layer of this adhesive was polymerizable in air in approximately 10 seconds by exposure to light from a Caulk Prisma-Lite TM unit. While this polymerized layer exhibited a slightly tacky surface, it was easily polishable and substantial to the touch. This filled adhesive was employed to bond together two glass microscope slides. The bond thus formed was strong and resisted boiling water for at least 2 hours.

EXAMPLE 4

A silaneous resin could be prepared comprising 10 g of 3methacryloxypropyltrimethoxysilane from which nearly all inhibitor has been removed (electrical grade from Petrarch Co.), 0.1 g camphoroquinone and 0.3 g methyldiethanolamine. This silaneous resin was sluggishly curable employing a Prisma-Lite TM unit. When a filler composition such as silanated finely particulated quartz is added to this silaneous adhesive formulation, polymerization with visible light is facilitated. Accordingly, a 1:5 blend of resin and filler is easily curable with the Prisma-Lite TM unit and is suitable for use as a high temperature, water resistant adhesive composition.

EXAMPLE 5

The composition of Example 4 could be admixed with 0.2 g of benzoyl peroxide. This improved composition is readily photopolymerizable both with and without inorganic, particulate filler.

EXAMPLE 6

A filled, light curable adhesive composition was formulated as follows: 76 g of Epocryl TM 370 (Shell Chemical Co.) was mixed with 20 g of 3-methacryloxytrimethoxysilane (electrical grade-Petrarch), 3 g of N-methyldiethanolamine, and 1 g of camphoroquinone. 2 g of this resinous matrix was mixed with 0.1 g of colloidal silica (Syloid TM 63-X, W. R. Grace Co.) until uniform. 7.9 g of 400 mesh vitreous silica was then added to the partially filled resinous composition, blended until fully dispersed, and repeatedly degassed in vacuo. This material cures rapidly when exposed to visible light and may be used to adhere glass to glass, porcelain to porcelain, glass to porcelain, glass to steel, etc.

EXAMPLE 7

The composite adhesive of Example 6 was used to fill a prepared, human tooth. Thus, a human tooth was excavated in the traditional way, filled with the material of Example 6, and exposed for 20 seconds to visible light at an intensity of 400 mw/cm^2/sec. The material photopolymerized easily, filled the tooth cavity completely, and evidenced good resistance to aqueous fluids.

EXAMPLE 8

The effectiveness of photopolymerization promoters was demonstrated. A mixture of 60% Epocryl TM 370 and 40% 3-methacryloxypropyltrimethoxysilane was formulated. To this stock solution was added either nothing, 1% by weight copper II-ethylacetoacetate, 0.5% camphoroquinone, or 0.5% camphoroquinone and 1% copper ethylacetoacetate. Each of the materials was exposed to light from a Caulk Prisma-Lite TM unit and the results recorded. Both the unmodified resin mixture and the resin mixture having the copper compound did not polymerize after 60 seconds of exposure from the light. The mixture having only camphoroquinone gelled sluggishly yielding a tender, gelatinous polymerizate. The composition having both the camphoroquinone and copper polymerization promoter gelled rapidly and completely demonstrating a tough polymerizate. Accordingly, species such as copper II ethylacetoacetate may replace amine species such as methyldiethanolamine in the visible light curable silaneous adhesives of the present invention.

EXAMPLE 9

A high temperature, photocurable adhesive resin composition was formulated from the following constituents:

methacryloxypropyltrimethoxysilane (electronic grade)	113 g
Epocryl TM 370 acrylic species (Shell Co.)	80 g
camphoroquinone	1 g
N—methyldiethanolamine	2 g
vinyltris(methoxyethoxy)silane	3.8 g
benzoyl peroxide	0.2 g
copper II ethylacetoacetate	1 g
Dow-Corning 193 silicone surfactant	1 g
Irgacure TM 651 (benzoin dimethylketal)	1 g
	203 g

This unfilled material polymerized to a depth of approximately 7.0 mm after exposure for 20 seconds to light from a Caulk Prisma-Lite TM unit.

EXAMPLE 10

10 g of the composition of Example 9 were mixed with 0.8 g of pyrogenic silica (Aerosil TM -972), and 40 g of microfine vitreous silica. This filled material polymerizes to a depth of approximately 4.3 mm after exposure to visible light from a Caulk Prisma-Lite TM unit. After a 20 second exposure to a 1.0 watt/cm^2/sec visible light source, polymerization to approximately 5.5 mm was evidenced. This filled composition was used for the fixturing of a lamp tube to its supporting sleeve, polymerizing the composition for 10 seconds with said 1 watt source. Operation of the lamp for approximately 45 minutes at 200° F. demonstrated that the adhesive continued to bond, generated no smoke, evidenced no odor, and showed little discoloration.

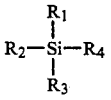
What is claimed is:

1. A process for filling teeth comprising

applying to a prepared tooth cavity a light polymerizable adhesive comprising

a polymerizable resin composition comprising

(a) more than about 50% by weight of at least one silane having the formula



where R_1–R_4 are the same or different and are H, alkyl, alkenyl, aryl, aralkyl, alkaryl, alkoxy, vinyl, aryloxy, or acyloxy having from 1 to about 30 carbon atoms and where at least one of R_1–R_4 is alkyl, aryl, aralkyl or alkaryl having from 1 to about 30 carbon atoms and is substi-