

DISCERNIBLE DENTAL SEALANT

BACKGROUND OF THE INVENTION

This invention relates to compositions and methods for sealing pits and fissures in tooth surfaces (i.e. dental enamel).

Almost all children are plagued with dental surface imperfections—commonly termed pits and fissures—which tend to harbor and permit proliferation of microorganisms which can cause formation of caries. Since normal dental hygiene methods such as tooth brushing are relatively ineffective against these physically protected microorganisms it has been the practice of many dentists for a considerable time to attempt to seal the pits and fissures so as to eliminate these sites for microorganism growth.

Commonly used pit and fissure sealants are composed of a polymerizable resin system, such as the polymerizable acrylic system described in U.S. Pat. No. 3,066,112 (Bowen), free of filler. The reason for the common use of a resin system free of filler is indicated by U.S. Pat. No. 3,815,239 (Lee et al.) which teaches that pit and fissure sealants must be of sufficiently low viscosity to be capable of flowing into the pits and fissures to assure complete sealing and good adhesion to the tooth surface.

A common drawback associated with such sealants which are free of filler is that they are transparent (or, at best, translucent) and consequently it is difficult for the dentist to ensure accurate placement and adequate coverage of pits and fissures when using such sealants. The placement difficulty reduces the effectiveness of the treatment itself because the dentist may not observe that some pits and fissures remain unsealed. Further, with respect to some other pits and fissures the dentist may apply much more sealant than necessary simply because of the difficulty in observing the sealant in place. Additionally, periodical re-checks by the dentist to replace worn or dislodged sealant or to apply additional sealant to newly developed pits and fissures are rendered difficult or uncertain because of the difficulty in ascertaining the presence or absence of such transparent or translucent sealings.

Although it might appear possible to provide a suitable discernible pit and fissure sealant by simply adding a pigment to a polymerizable resin, it has been found that the pigment easily settles out of the sealant upon standing. Accordingly, the sealant must either be stirred thoroughly prior to use or the pigment must be added to the resin system and stirred at each time of use.

Others have suggested the incorporation of an ultraviolet fluorescing dye into the polymerizable resin which can then be detected on a tooth surface under ultraviolet light. However, this technique requires the use of ultraviolet light and, furthermore, the dye may leach out of the sealant on the tooth with passage of time.

Similarly, simple dilution of commercially available dental restorative paste by addition of unfilled resin does not produce a desirable pit and fissure sealant because at low levels of dilution the material is too high in viscosity to penetrate adequately into pits and fissures, and at high levels of dilution the material is not sufficiently discernible on tooth surfaces.

The compositions and methods of the present invention are adapted for filling and sealing pits and fissures in tooth surfaces in a discernible manner.

SUMMARY OF THE INVENTION

In accordance with the present invention it has been found that pits and fissures in tooth surfaces may be filled and sealed in a discernible manner by the method comprising:

(a) applying to the tooth surfaces a composition comprising a polymerizable resin system, finely divided hydrophobic opaquing filler present in an amount of about 0.1 to 5% by weight based on the weight of the resin system, and hydrophobic suspending agent present in an amount of about 1 to 10% by weight based on the weight of the resin system, the composition having a viscosity not greater than about 600 centipoise when applied to the tooth surfaces; and

(b) hardening the composition in situ to produce a discernible coating.

It has also been found that discernible, shelf-stable pit and fissure sealant compositions are those containing polymerizable resin, 0.1 to 5% by weight (based on resin weight) of hydrophobic opaquing filler, and 1 to 10% by weight (based on resin weight) of hydrophobic suspending agent. It is unexpected that such a composition could be prepared which would be (a) sufficiently fluid to be effective as a pit and fissure sealant, and (b) sufficiently opaque to be discernible on tooth surfaces, and (c) sufficiently shelf-stable at low viscosity to be commercially useful. It is also unexpected that the opaquing filler and the suspending agent must be rendered hydrophobic, and be present in the composition in proper amounts, in order to produce the results desired in the invention.

These compositions as applied to tooth surfaces are found to adhere very well and seal pits and fissures very effectively. These sealants are of sufficient contrast to the tooth that they can be easily and quickly placed by the dentist in an efficient manner. The sealant accordingly can be readily verified upon subsequent checkups of the patient and yet the sealant does not present an unsightly or objectionable appearance.

Furthmore, the compositions of the invention exhibit prolonged shelf life without separation of the ingredients.

DETAILED DESCRIPTION OF THE INVENTION

The compositions useful in the present invention may be in various forms. For example, the composition may be composed of two fluid materials, each having a viscosity in the range of about 200 to 600 centipoise, disposed in separate containers from which a dentist may dispense necessary amounts of material which when mixed together will produce a sealant which is discernible on tooth surfaces. The material in the first of the containers consists essentially of polymerizable resin, finely divided hydrophobic opaquing filler in an amount of about 0.1 to 5% by weight (based on weight of resin), hydrophobic suspending agent in an amount of about 1 to 10% by weight (based on weight of resin), and catalyst; the material in the second of the containers consists essentially of polymerizable resin, finely divided hydrophobic opaquing filler in an amount of 0.1 to 5% by weight (based on weight of resin), hydrophobic suspending agent in an amount of about 1 to 10% by weight (based on weight of resin), and accelerator reactive with the catalyst in the first container.