

- [54] **SIMPLIFIED METHOD FOR OBTAINED STRONG ADHESIVE BONDING OF COMPOSITES TO DENTIN, ENAMEL AND OTHER SUBSTRATES**
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**Related U.S. Application Data**

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- [58] Field of Search ..... **433/228.1; 523/116, 523/115, 114; 106/35; 424/147; 260/998.11**

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[57] **ABSTRACT**

Materials and methods for improving the adhesion of composite materials and resins to dentin, enamel and other substrates are disclosed. Preferably, the substrate surface is treated with an aqueous solution of (1) at least one acid (preferably nitric acid), (2) at least one polyvalent cation (preferably an aluminum cation) which can bind to dentin or enamel, and (3) at least one compound (preferably oxalic acid) which forms relatively water-insoluble precipitates with calcium and with polyvalent cations at pH values above that of the acidic treatment solution, and (4) a composition preferably comprising N-phenylglycine and/or other amino acids. Then, a solution is applied which contains at least one compound selected from the group consisting of (1) the addition reaction product of pyromellitic acid dianhydride and 2-hydroxyethyl methacrylate ("PMDM"), (2) the addition reaction product of 3,3',4,4'-benzophenonetetracarboxylic dianhydride and 2-hydroxyethyl methacrylate ("BTDA-HEMA"), (3) 4-methacryloxyethyltrimellitic anhydride ("4-META"), and (4) other monomers. Alternative embodiments are also set forth.

46 Claims, No Drawings