

Antimicrobial dental adhesive graphene-based.

KEYWORDS

- ☐ ADHESIVES
- ☐ ETCH AND RINSE ADHESIVE
- ☐ ANTIMICROBIAL ADHESIVE
- ☐ CAVITY
- ☐ FUNCTIONAL REHABILITATION
- ☐ DENTAL RESTORATION

AREA

- ☐ BIOMEDICAL

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Priority Number

n. 102016000021868 _ 02.03.2016.

Patent Type

Patent for invention.

Ownership

Sapienza University of Rome 100%.

Inventors

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Industrial & Commercial Reference

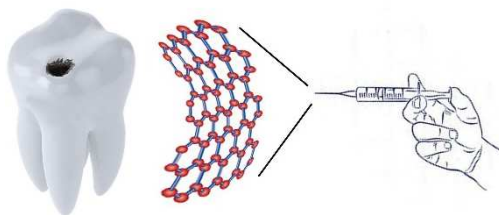
Products and materials of dental industry.

Time to Market

The time required for the clinical trial, since all laboratory-level tests having been performed.

Availability

Cession, Licensing, Research, Development and Experimentation.



Abstract

The patent is based on a dental adhesive with antimicrobial and antibiofilm properties taking advantage of the use of graphene-based micro and nanometer fillers.

The nanomaterials introduced into an adhesive are uniformly dispersed, without agglomerations inside the polymer and partially exposed over the adhesive surface.

These significantly inhibit, by mechanical action, adhesion and bacterial growth. FE-SEM imaging studies and microtensile bond strength measurements have demonstrated excellent mechanical performance of the experimental adhesive.

Publications

- ❖ Bregnocchi A., Zanni E., Uccelletti D., Marra F., Cavallini D., De Angelis F., De Bellis G., Bossù M., Ierardo G., Polimeni A., Sarto MS. "Graphene-based dental adhesive with anti-biofilm activity" J Nanobiotechnology. 2017 Dec 12;15(1):89. doi: 10.1186/s12951-017-0322-1.



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Technical Description

The adhesive object of the patent consists of a dental adhesive composed of BisGMA, filled with graphene based nanoplatelets or its derivatives incorporated into the polymer matrix. Graphene nanoplatelets (GNP) can be produced at low cost by thermal expansion.

The antimicrobial and antibiofilm effect of dental adhesive is due to the mechanical damage of the bacterial membrane caused by the cutting edges of 2D carbon nanomaterials and to the reduced / non-adhesion of the cariogenic bacteria to this type of surfaces.

The production of this adhesive does not require structural changes to companies producing dental adhesives.

Technologies & Advantages

The main innovation consists in the particular production process of the new adhesive that possess antimicrobial properties.

The GNP or derivatives thereof are based on multilayer graphene nanoplatelets dispersed uniformly without agglomerates in the starting polymer matrix.

They are characterized by edges that allow a mechanical interaction of these nanomaterials with bacterial cell walls, acting as nano-knives, with strong antimicrobial and anti-adhesive properties.

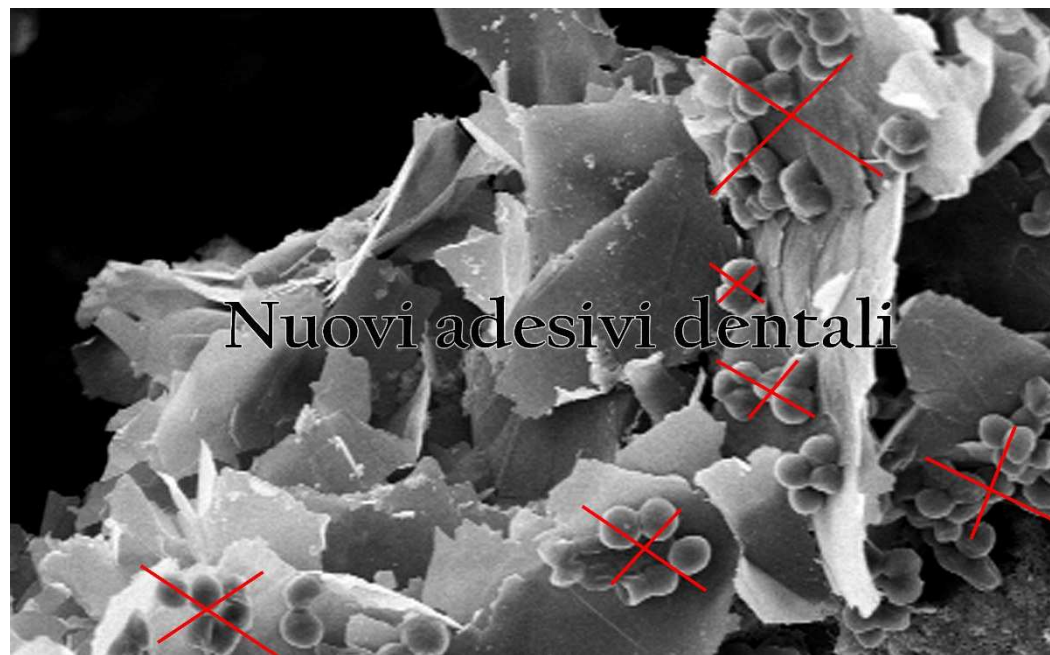
Moreover, since they possess the properties of the basal plane typical of 2D graphene, at a lower cost and without its technological problems, the GNP and their derivatives can be used on a large scale.

In vivo experiments on a multicellular model system such as *C.elegans* highlighted its non-toxicity.

This patent can represent a valid solution for the development at industrial scale of anti-biofilm devices that will reduce the incidence of secondary caries.

Applications

Dental adhesive with antimicrobial properties.



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