

Hybrid composite for root canal treatment

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A researcher produces laboratory samples based on the new material. (© Fraunhofer ISC)

(PhysOrg.com) -- A dentist carrying out root canal treatment will need to use a variety of compounds. These do not always bond together properly and sometimes expensive follow-up treatment has to be performed. But a new class of material meets the requirements and solves the problem.

Unrelenting toothache means a visit to the dentist is inevitable, and if the [tooth decay](#) is really bad root canal treatment is often the only option. The dentist first removes the nerve completely and then closes the ensuing canal with a filler. This must be airtight to prevent bacteria from entering and causing renewed inflammation. On the other hand, the material must also be removable. If the natural crown is severely

damaged, the dentist will anchor a root post in the previously filled canal using dental [cement](#).

The post provides an anchor for the [composite material](#) used to rebuild the remaining part of the tooth, the core, which serves as the base for the core build-up material and the prosthetic treatment e.g. a crown. In root canal procedures, therefore, various materials are combined, each fulfilling different requirements. The problem is that the materials are not always compatible with each other or do not bond properly with the hard dental tissue. As a result, the post may break, the core and the crown may not adhere to the post properly, and the expensive crown may need replacing. Such faults are not rare and generally occur in the single-digit percent range.

Researchers at the Fraunhofer Institute for Silicate Research ISC in Würzburg working in collaboration with their research partners at VOCO GmbH have now developed a material that can be used for all the components used in root canal treatment.

“The basis of this material is provided by ORMOCER®s,” explains Dr. Herbert Wolter, group manager at the ISC. “We have combined these ORMOCER®s with various nano- and microparticles to achieve the highly diverse properties needed.” Materials used in filling the root canal, for instance, should not shrink as they harden, should form an airtight bond with the dental material and be visible in x-rays. The material used to rebuild the tooth, on the other hand, should have the same properties as the tooth itself. “Hybrid materials are well suited to these requirements. For instance, they only shrink by about 1.3 percent as they harden, while standard materials generally shrink by 2 to 4 percent. ORMOCER®s can also be adapted to adhere to the different parts of the tooth,” says Wolter. VOCO GmbH is already producing dental preparations and product development is making good progress. Market launch could therefore be just a few years away.

Provided by Fraunhofer-Gesellschaft

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