Look ma, no mercury in fillings!

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Tooth enamel is hardest material in the human body because it's made almost entirely of minerals. As tough as it may be, however, enamel can be broken down by bacteria, forming cavities and eventually destroying the tooth. That's why dentists repair cavities by filling them with a material to replace the lost enamel. The most common such restorative is a material invented in the 19th-century known as amalgam -- the classic silver-black fillings many people have.

Amalgam works well because it is very durable, easy to use, and cheap. The dark fillings are sometimes unsightly, however, and they contain mercury. Because of the mercury, amalgam has raised health and environmental questions -- though according to the American Dental Association, the scientific consensus is that the material poses no health hazards. Dentists would love to have a perfectly white material that mimics natural enamel for repairing cavities in teeth, but for the most part, they still use amalgam. Other filling materials have been developed in recent years, but they often have problems with shrinkage or durability.

Kent Coulter and his colleagues at Southwest Research Institute in San Antonio have developed a new proof-of-concept dental restorative material under a program funded by the National Institutes of Health that seeks to replace amalgam with other materials. They will describe the material on November 9 at a meeting of the scientific society AVS in San Jose. The new fillings are made with a plastic-like material containing zirconia nanoplatelets -- tiny crystals made of the same sort of material used to make fake diamonds and gem stones. Unlike their

costume jewelry cousins, the zirconia nanoplatelets super hard because of a difference in the particular arrangements of the atoms in the material.

Coulter and his colleagues designed a way to make a roll of this material under vacuum. They envision that this material would be lifted from the roll and packed in a dental cavity and then cured -- using an ultraviolet lamp or some other means -- so that it hardens in place without shrinking. In San Jose, they will describe how they have been developing and testing the performance of these materials in the laboratory. Its use is still several years away from the dentist's chair, however, and the next steps will be first to see if the new material performs as hoped for people with cavities.

Source: American Institute of Physics