

Dental Demineralization Detection

This technology offers an optical imaging for early detection of this enamel decay leading to intervention before cavity formation. Demineralization indicators can be quantified using laser-induced autofluorescence which is a reliable, safe, and low-cost alternative to the current inconsistent X-ray and visual inspections.

What is the Problem?

Tooth decay is initiated by bacterial acids that destroy a region of the outer enamel layer of a tooth. This results in demineralization of the sub-surface enamel, leading to cavity formation, at which point the tooth will require a filling. If this process continues, more serious destruction occurs that could require extraction of the tooth or a more invasive filling.

What is the Solution?

Optical imaging is used for early detection of this enamel decay process, allowing for intervention before a cavity is formed. Laser-induced autofluorescence (AF) from multiple excitation wavelengths is induced in enamel. The relative intensities of the AF emission when the enamel changes from healthy to demineralized. This can be quantified and serve as an indicator of early-stage enamel demineralization. This can be used in conjunction with a scanning fiber endoscope to provide a reliable, safe and low-cost means for identifying dental caries or decays.

What Differentiates it from Solutions Available Today?

A cavity can be seen on X-ray and often by eye by a dentist. X-ray and visual inspection often lack the sensitivity to detect lesions at an early enough stage where remineralization is possible. In addition, repetitive monitoring of suspected demineralization by X-ray imaging may be not safe to use for children. Other detection means such as using ultrasound technologies may lack sufficient sensitivity and specificity and are bulky and expensive. This technology is a reliable, non-invasive, and cost-effective means for identifying areas at risk of forming a cavity. Current solutions cannot consistently identify a cavity before formation, typically leading to a filling. This technology could treat the at-risk area before a cavity has a chance to form.

Patent Information:

[US10888230B2](#)

Technology ID

BDP 8663

Category

Device/Other
Selection of Available
Technologies

Authors

Eric Seibel

Learn more



References

1. Stephanie U. Tran, Jeremy S. Ridge, Leonard Y. Nelson, Eric J. Seibel(41334) ,
https://www.researchgate.net/publication/258811675_Laser_investigation_of_the_non-uniformity_of_fluorescent_species_in_dental_enamel, Proceedings of SPIE