Spectra Caries Detection Unit

Caries develop into decays which can lead to tooth loss.

Our caries detector camera can let you know if you have caries, and help the dentist localise and remove the caries of in minor caries put you on appropriate prevention treatment.

Optical methods for the detection of carious lesions, calculus and plaque have the advantage of being minimally invasive. The use of endogeneous fluorescence markers like porphyrins could simplify the application of fluorescence techniques in the dental practice.

It is known that porphyrins are produced by some of the bacterial species that are present in the oral cavity. Since porphyrins have an excitation band at about 400nm they have the potential to be used as fluorescent markers of locations in the oral cavity where the production of bacteria is out of the limits of healthy regions.

Further, modern and efficient GaN-based semiconductor diodes emit light in this spectral range and thus make the implementation of fluorescence sensors with excitation at this wavelength easy. Carious lesions, calculus and plaque have been measured using a self-build fluorescence camera using GaN-diodes for illumination at 405nm.

Further, emission spectra under this excitation were recorded. For the latter purpose freshly extracted teeth were used. It has been found that already in the case of an initial carious lesion red porphyrin-fluorescence is emitted whereas it is absent in healthy enamel.

In already brown coloured carious lesions the emission bands of porphyrin are present but the observed overall fluorescence intensity is lower, probably due to the absorption of the fluorescence by the carious defect itself. In dental calculus, dental plaque and subgingival concrements porphyrin originated luminescence was found as well. Since in these cases the emission spectra differ slightly it can be concluded that they originate from different types of porphyrins and thus also from different bacteria.

These results show that this fluorescence technique can be a promising method to diagnose carious lesions, calculus and plaque.