

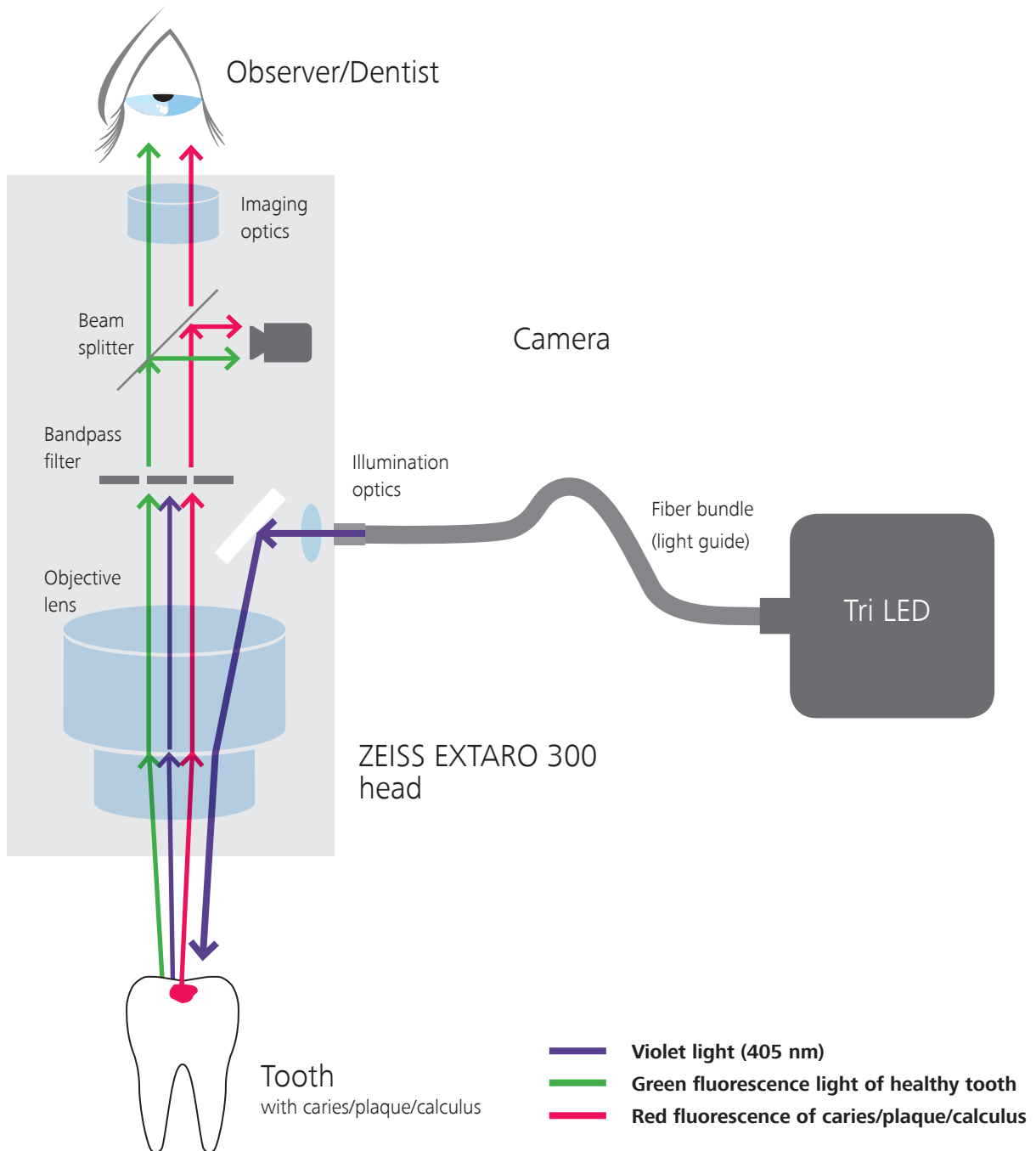
# **EXTARO® 300 from ZEISS**

Working principle of  
Fluorescence Mode



# Working principle

Schematics of Fluorescence Mode of EXTARO® 300 from ZEISS



# Principle

## The underlying principle of dental auto-fluorescence

The working principle of the Fluorescence Mode is based on the auto-fluorescent properties of the dental hard tooth tissue and Porphyrin. Under an excitation wavelength ranging from  $\lambda = 370 \text{ nm} - 488 \text{ nm}$  (violet - blue light) the tissue begins to fluoresce in a bright green color. Using an optical bandpass filter the residual excitation light is cut off to obtain a clear result, free of scattered and reflected excitation light. This insures that only green and red wavelengths reach the observer (Kühnisch, J., and R. Heinrich-Weltzien. "Quantitative Light-induced Fluorescence (QLF)-A Literature Review." International journal of computerized dentistry 7 (2004): 325-338).

When tooth tissue decays on the basis of bacterial demineralization, Porphyrin compounds are formed as a by product. Porphyrin has an absorption peak at  $\lambda = 405 \text{ nm}$  resulting in a fluorescence mainly ranging from  $600 \text{ nm} - 700 \text{ nm}$ , with peaks at  $622\text{-}624 \text{ nm}$  and  $680\text{-}687 \text{ nm}$  depending on the type of caries. As Porphyrin compounds can be found in matured dental plaque, calculus and caries lesions, the Fluorescence Mode of ZEISS EXTARO 300 makes these visible as a red fluorescence in contrast to the green fluorescing tooth tissue. (Van der Veen, M. H. "Detecting Short-Term Changes in the Activity of Caries Lesions with the Aid of New Technologies." Current Oral Health Reports 2.2 (2015): 102–109. PMC. Web. 8 Aug. 2017). This not only aids you in spotting carious lesions, but also enables you to save time during the caries excavation process. (Lennon, A. M., et al. "Efficiency of 4 caries excavation methods compared." Operative dentistry 31.5 (2006): 551-555.)

### Differences to Fluorescence-Aided Caries Excavation and Qualitative Light-induced Fluorescence methods

Well-established methods like Fluorescence-Aided Caries Excavation (FACE) and Qualitative Light-induced Fluorescence (QLF) are based on the same working principle as the Fluorescence Mode of ZEISS EXTARO 300. Similar to FACE, the detector of the fluorescence signal in ZEISS EXTARO 300 is in the eye of the observer. The images aquired by the camera are for patient information and documentation purposes. In particular, there is no quantitative analysis of the images.

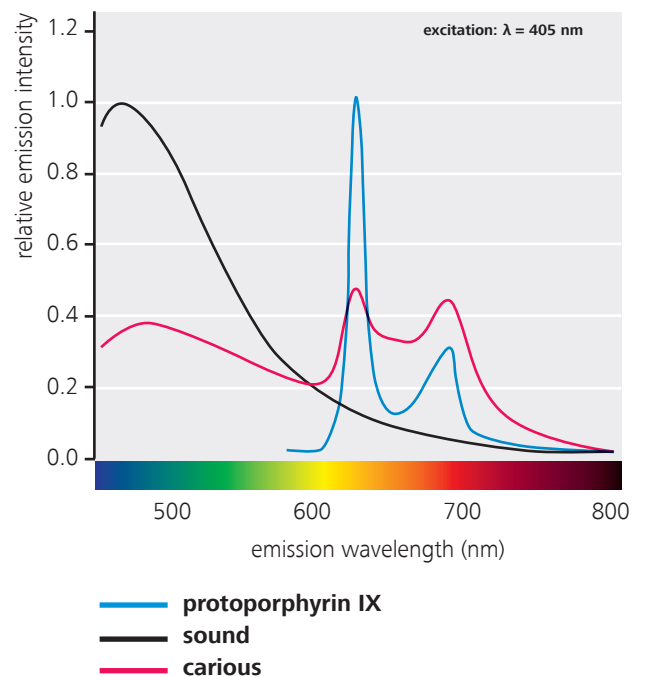


Figure based on:  
Buchalla W, Lennon ÁM, Attin T: Comparative fluorescence spectroscopy of root caries lesions. Eur J Oral Sci; 112, 490-496 (2004)  
Buchalla W, Attin T, Niedmann Y, Niedmann PD, Lennon ÁM: Porphyrins are the cause of red fluorescence of carious dentine: Verified by gradient reversed-phase HPLC. Caries Res; 42, 223 (2008)



**Carl Zeiss Suzhou Co., Ltd**  
Modern Industrial Square 3-B,  
No.333 Xingpu Road  
Suzhou Industrial Park, Suzhou  
China 215126  
Phone: +86 512 6287 1388  
Fax: +86 512 6287 1366



**Carl Zeiss Meditec AG**  
Goeschwitzer Strasse 51–52  
07745 Jena, Germany  
Phone: +49 36 41 22 03 33  
Fax: +49 36 41 22 01 12  
[www.zeiss.com/med/contacts](http://www.zeiss.com/med/contacts)  
[www.zeiss.com/dentistry/extaro-300](http://www.zeiss.com/dentistry/extaro-300)