



Determination of tetracycline in enamel and dentin of human teeth by fluorescence spectroscopy: *in vitro* study

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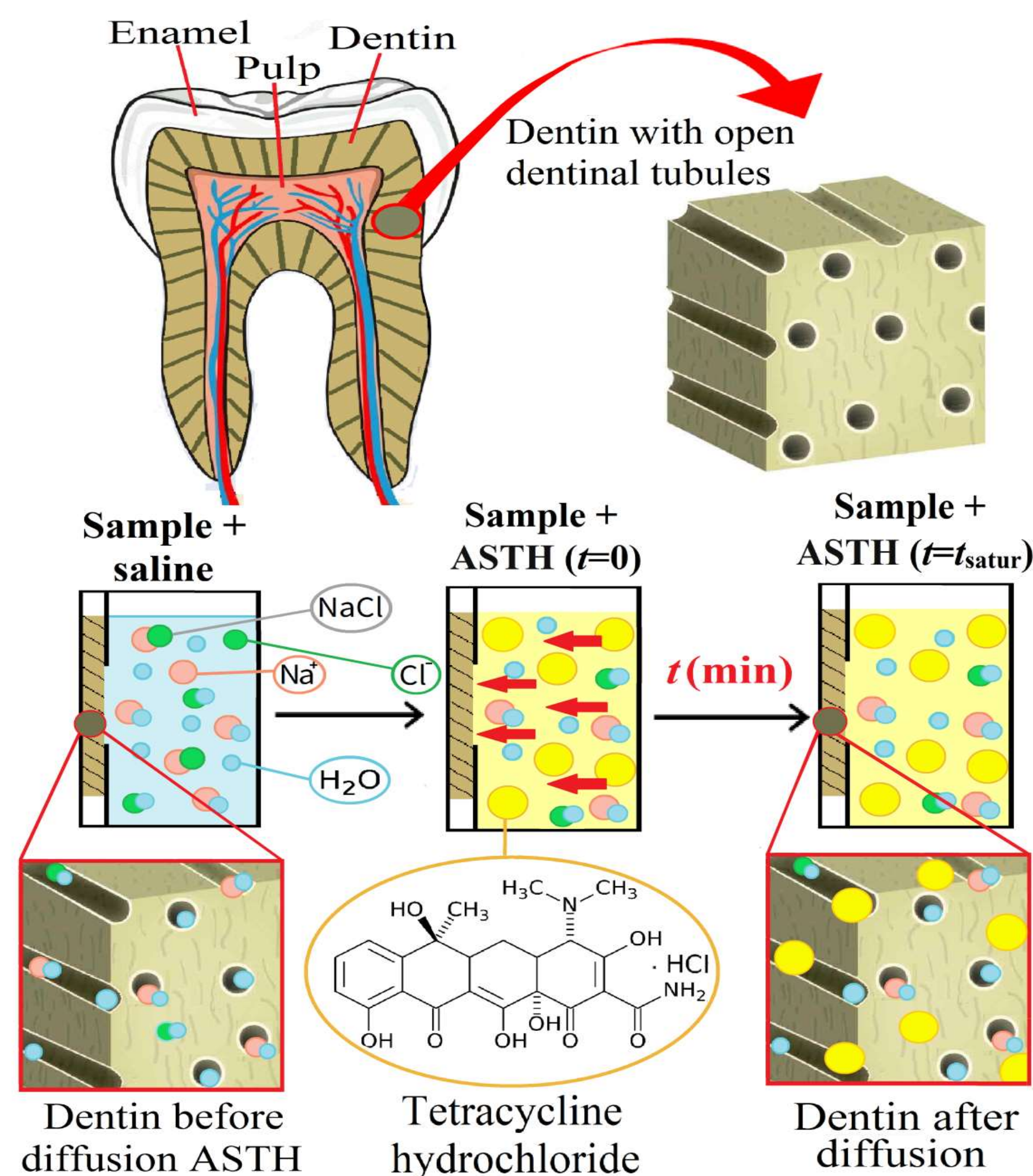
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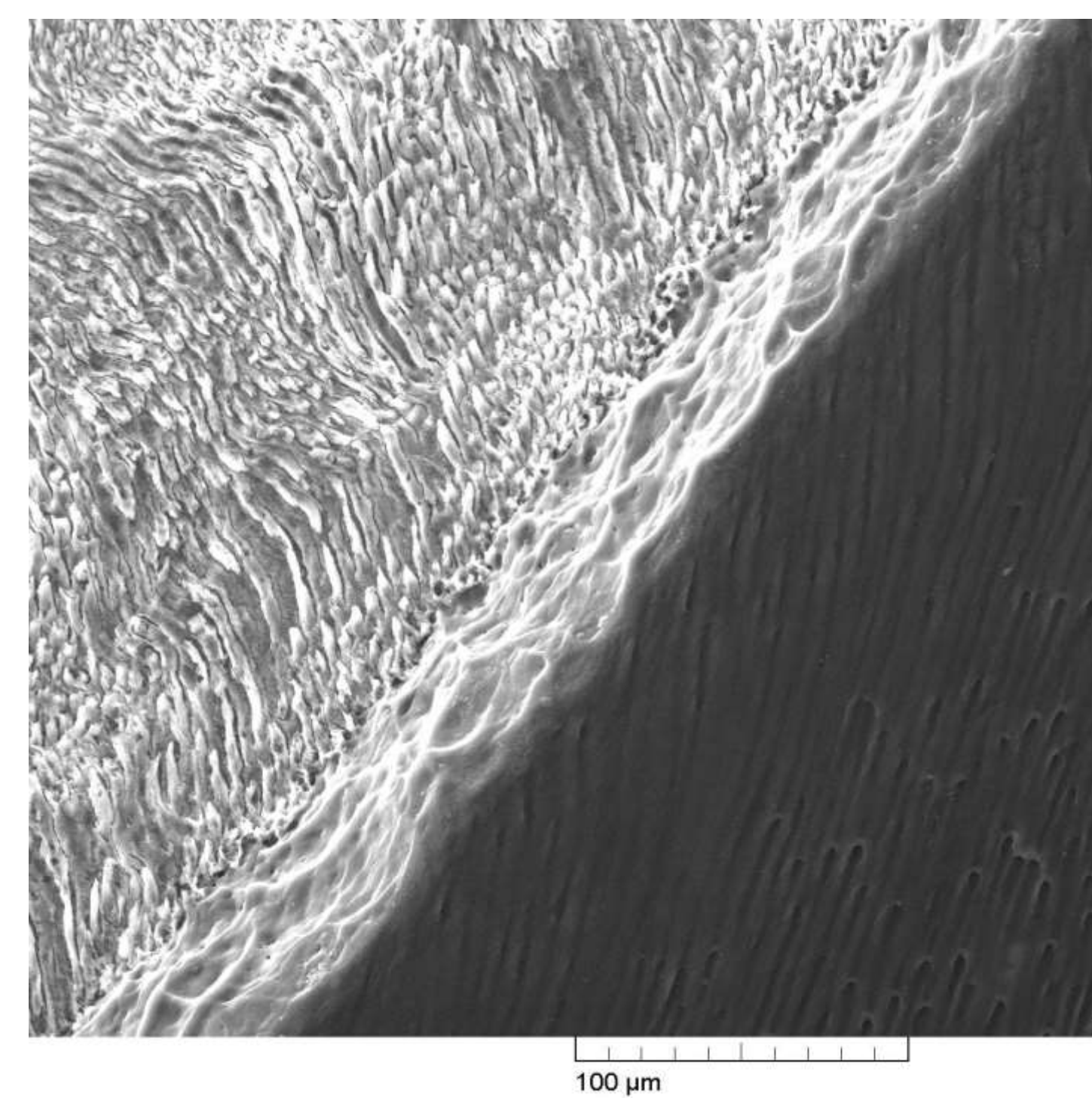
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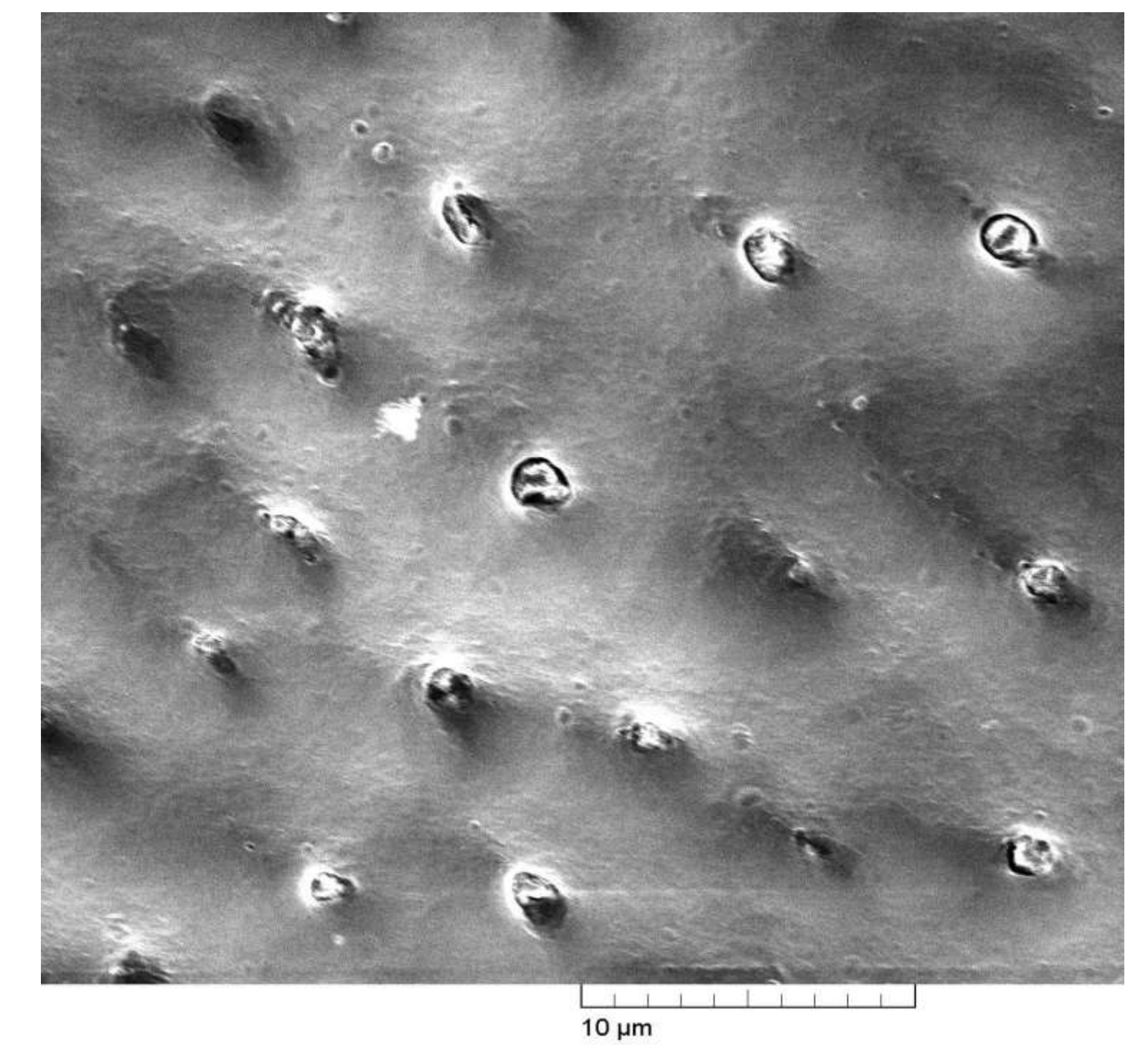
Dentin samples during impregnation with an aqueous solution of tetracycline hydrochloride (ASTH)



Electronic micrographs (SEM) of a longitudinal cut of a human tooth



dentin-enamel junction

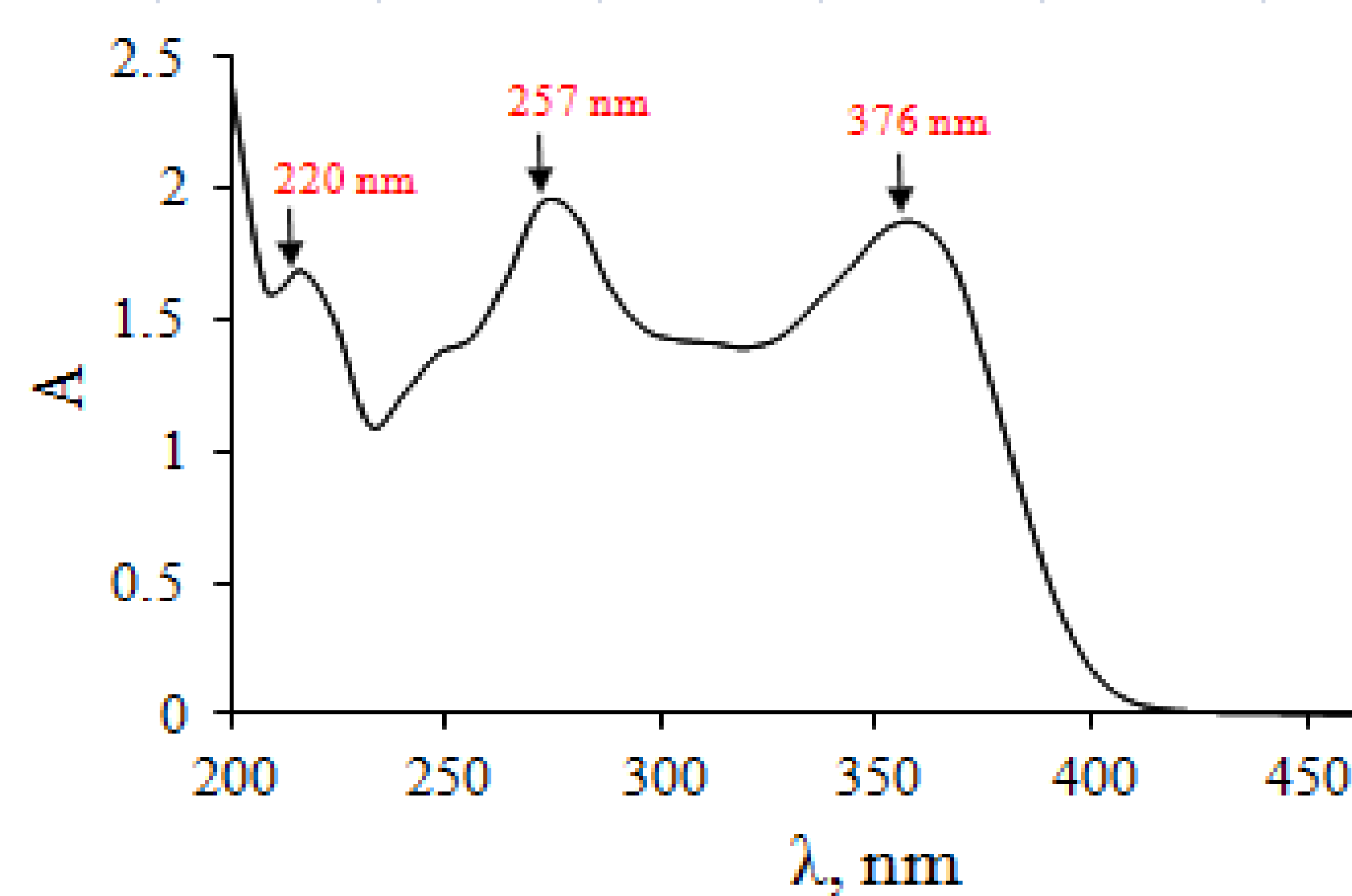


part of the saw cut of the crown

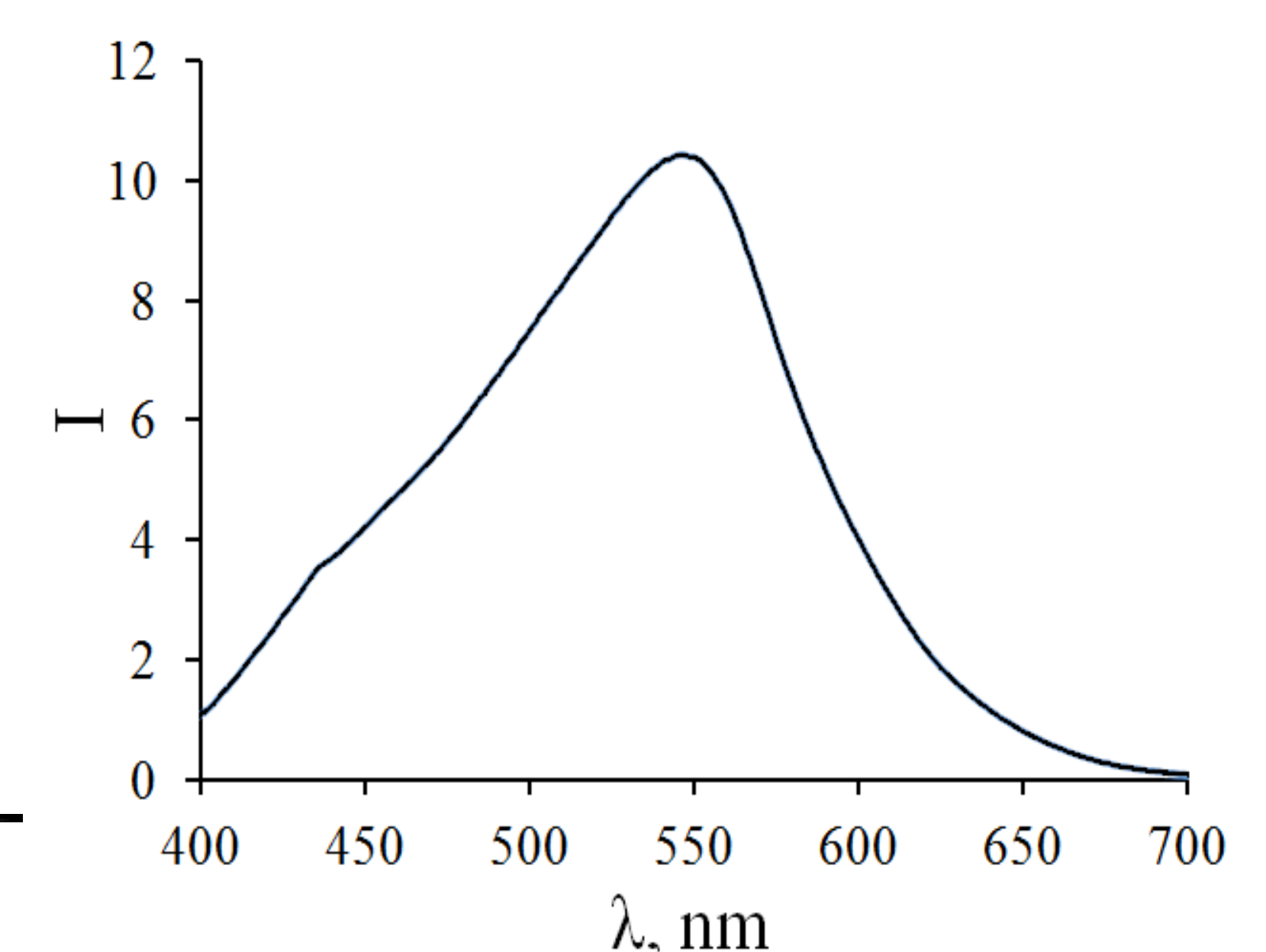
Spectrofluorometer and study samples



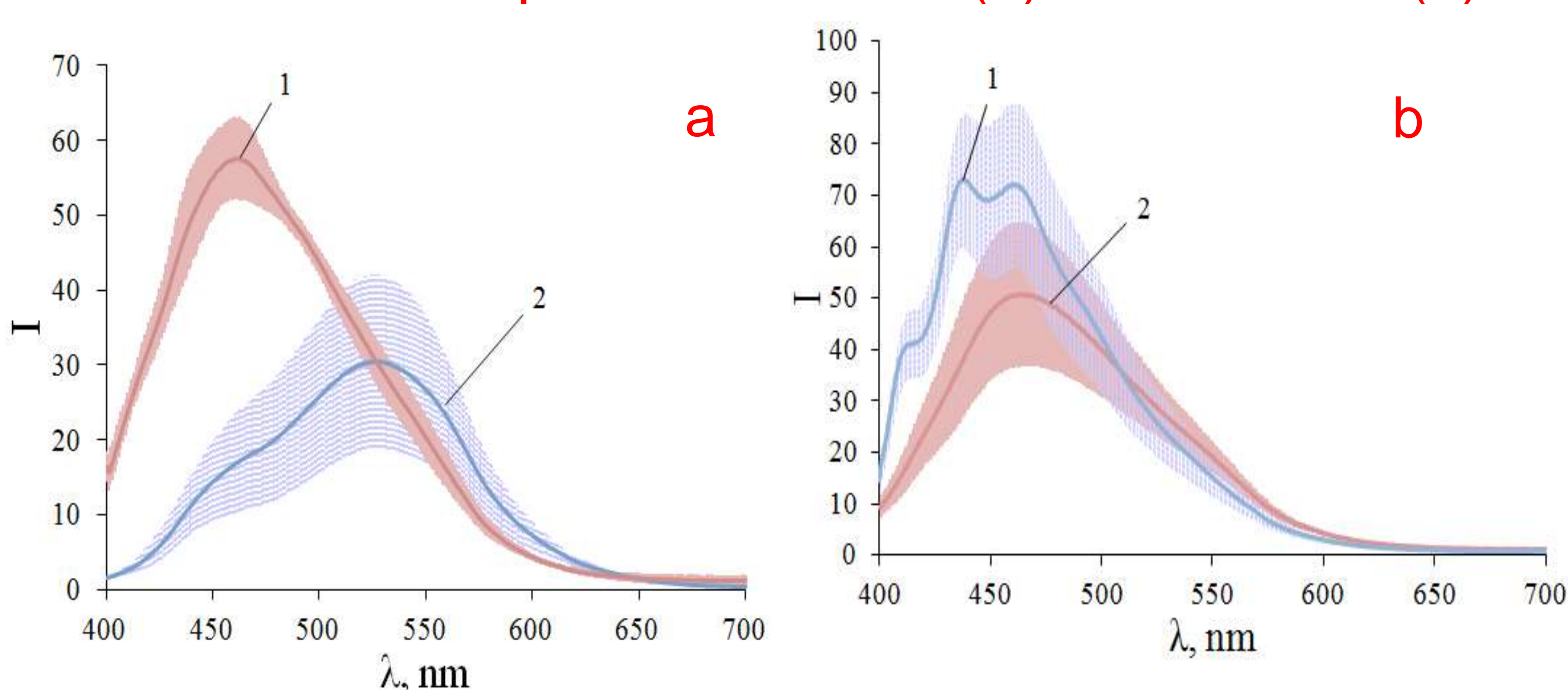
Absorption spectrum of ASTH



Fluorescence spectrum of ASTH at λ=376 nm

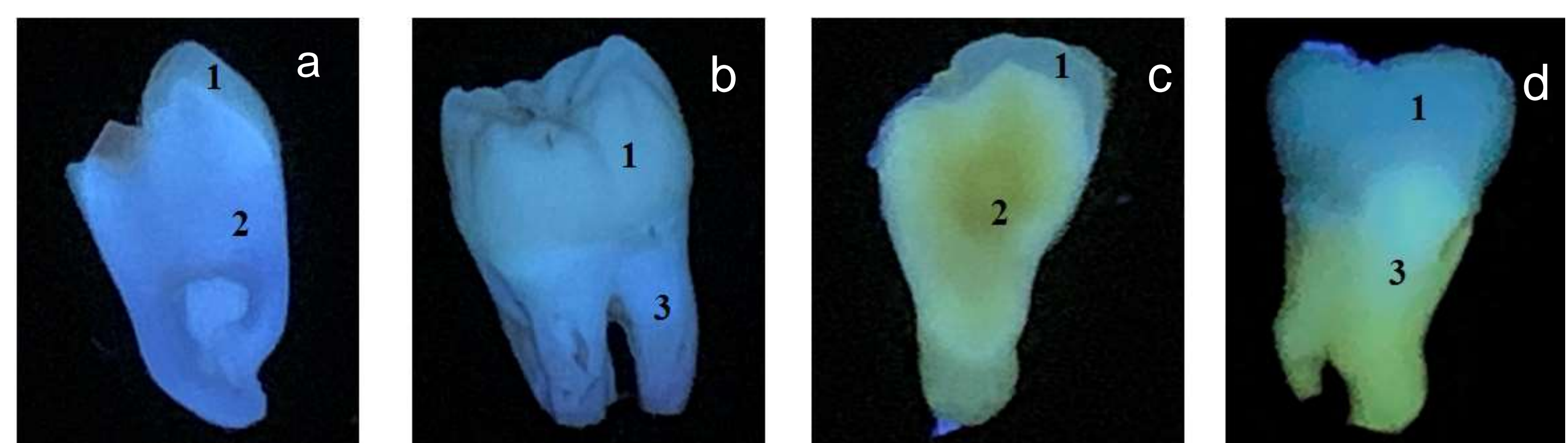


Fluorescence spectra of dentin (a) and enamel (b):



1 – initial, 2 – after ASTH diffusion ($C=1.1 \cdot 10^{-4}$ Mol/l) at $\lambda=376$ nm

Photographs of human tooth samples taken in a video densitometer "SORBFIL" (Russia) with an ultraviolet lamp, emission spectrum - 365 nm
1 - enamel; 2 - dentin; 3 - tooth cement



a - original slice, b - original whole tooth, c - slice after tetracycline solution diffusion, d - whole tooth after tetracycline solution diffusion.

CONCLUSIONS

When tetracycline is used in childhood, as well as during intrauterine or ectopic exposure before teething through the gums during mineralization or calcification of the teeth, the antibiotic binds to calcium ions in the teeth. This leads to permanent staining of the teeth. In dentistry, the term "tetracycline teeth" even arose. The spots can be gray or brown in color and often appear in streaks around the teeth. During teething and exposure to light, calcium-bound tetracycline oxidizes, causing the enamel to change color from fluorescent yellow to brown. In this study, using fluorescence spectroscopy, it was determined that tetracycline exhibits characteristic fluorescence peaks in the enamel and dentin of human teeth after their complete mineralization after exposure to an antibiotic solution *in vitro*.

ACKNOWLEDGEMENTS

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