

## X-RAY FLUORESCENCE AND DIFFRACTION MAPPING OF DENTIN AT 200 NM

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Dentin is the mineralized tooth tissue that provides the toughness for the structure. It is a composite primarily consisting of mineral nanoplatelets (carbonated hydroxyapatite, cAp) embedded in collagen fibrils and of water. Within dentin, 1-2  $\mu\text{m}$  diameter tubules run from the junction with the outer hard covering (enamel) to the pulp cavity, and these tubules are spaced 5-10  $\mu\text{m}$  apart. Peritubular dentin (PTD) lies immediately adjacent to the tubules, intertubular dentin (ITD) comprises the majority of the tissue and important but incompletely understood differences characterize ITD and PTD.

This report presents results of diffraction and fluorescence mapping of bovine dentin performed with a 200 nm beam at station 2-ID-D of the Advanced Photon Source. To date, a large number of tubules have been mapped, and an interesting picture of the submicron structure is emerging. The diffraction data show that cAp's crystallographic texture continues from ITD into PTD despite the nearly complete absence of collagen in PTD. The fluorescence data show that near the tubule lumens, Zn levels are much higher than in the ITD. It is known that Zn can function as a potent cAp mineralization inhibitor, and one wonders whether Zn prevents mineralization from closing the canaliculi that transporting the ions and water needed for healthy dentin and pressure regulation.