Abstract Submitted
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Resonance Effects in the Ultraviolet Raman Spectroscopy of Collagen in Mineralized Tissues J. W. AGER III, Lawrence Berkeley National Laboratory, M. PUGACH, S. HABELITZ, University of California San Francisco, G. BALOOCH, Lawrence Berkeley National Laboratory, J. H. KINNEY, Lawrence Livermore National Laboratory, G. W. MARSHALL, University of California San Francisco, R. O. RITCHIE, Lawrence Berkeley National Laboratory — Ultraviolet resonance Raman spectroscopy (UVRRS) was used to investigate type I collagen in solid tissues including tendon, dentin, and bone. With 244 nm excitation, spectral features from both the amide backbone (amide I, II, and III) and resonance-enhanced side-chain vibrations (Y8a, tyrosine) were observed. This contrasts with reported Raman spectra of proteins in solution excited with similar UV wavelengths, where side chain vibrations, but not strong amide features, are observed. The height of the dominant amide I feature in teeth and bone can be reversibly increased/decreased in dentin by dehydration/rehydration cycles. Also, the amide I peak is relatively stronger in both human bone and dentin from older donors. The strong intensity of the amide I UVRRS feature in these mineralized tissues is attributed to an increase in the width of the $\pi \rightarrow \pi^*$ amide resonance in collagen compared to the solution phase. These findings suggest that UVRRS can be used as a specific probe of the collagen environment in bone and dentin.

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