

## Structure and Deformation Behavior of Human Dentin

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**Abstract.** The relationship between structure and stress accommodation mechanisms (deformation and fracture) of human dentin on macro-, micro- and nano- scales is discussed. Dentin is the hard basis of human teeth with complicated hierarchically organized structure, which is attested as a natural composite consisted of a bioorganic matrix armed by collagen fibers and apatite crystallites. Dentin exhibits the unique strength properties. On the macroscopic level, under tensile load, it behaves like a brittle solid, and like a viscoelastic one in the case of compression. At the same time, on the microscopic scale cracks in dentin grow in a viscoelastic manner under tensile loading. Structure, mechanical properties and crack growth of human dentin on macro-, micro- and nano- scales, including TEM study, are considered in detail. It was shown that a brittle response under tension is the macroscopic feature of dentin caused by dentin channels, while viscoelasticity is its intrinsic property.

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