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Effect of the Corneal Nano Structure on Light Transmittance

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Abstract

We performed a theoretical analysis for corneal transparency by using a 3D simulator of FDTD (Finite Difference Time Domain) method. For that purpose, we examined light transmittance through detection of output light intensity with a simplified lattice model for the collagen fibrils in the corneal stroma. The geometrical nano-structure of the collagen fibrils in the corneal stroma is the main factor for light transparency of the cornea. Thus, we examined the effect of fibril diameter and lamellae staking angle on the light transparency of the cornea.

Keywords: cornea, stroma, transparency, collagen fibril, Nano Structure

1. Introduction

When light incidents on the surface of a material, it would experience some optical phenomena such as reflection, refraction, and absorption. A transparent material like the human eye lets the great part of light pass through it. Humans
5 obtains most information from the light which passes through their eyes. Thus, the human eye should be transparent and also have adequate dioptric power to make a clear image on the retina. The cornea is one of the main optical elements of the eye, and it has high light transmittance and the highest dioptric power of the eye.

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