Reduction of measurement errors in OCT scanning

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Abstract

Optical coherence tomography (OCT) is a non-destructive optical technique, which uses a light source with a wide band width that focuses on a point in the sample to determine the distance (strictly, the optical path difference, OPD) between this point and a reference surface. The point can be superficial or at an interior interface of the sample (transparent or semitransparent), allowing topographies and / or tomographies in different materials. The Michelson interferometer is the traditional experimental scheme for this technique, in which a beam of light is divided into two arms, one the reference and the other the sample. The overlap of reflected light in the sample and in the reference generates an interference signal that gives us information about the OPD between arms. In this work, we work on the experimental configuration in which the reference signal and the reflected signal in the sample travel on the same arm, improving the quality of the interference signal. Among the most important aspects of this improvement we can mention that the noise and errors produced by the relative reference–sample movement and by the dispersion of the refractive index are considerably reduced. It is thus possible to obtain 3D images of surfaces with a spatial resolution in the order of microns. Results obtained on the topography of metallic surfaces, glass and inks printed on paper are presented.

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