Examination of structure and properties of historic glass with OCT

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In this contribution the application of Optical Coherence Tomography (OCT) for investigations of various glass artifacts will be presented. Since the OCT technique relies on multispectral interference of infrared light, it is well suited for examination of transparent and semi-transparent structures like archeological and stained glass, especially if collection of the sample is not possible.[1-6]

Among applications of OCT to the stratigraphy of glasses, the most important seems to be utilization of OCT for identification and characterization of leached and hydrated glass surface layers.[4] Particularly, the range of in-depth corrosion may be determined this way. The method is simple and not limited by neither sample preparation nor object size. Therefore it could be useful for a quick screening of museum collections as well as stained glass windows to identify possible threat to so called unstable glass from the storage conditions. Examples of OCT cross-sectional images useful for evaluation of the extent and character of atmospheric corrosion of stained glass and for identification of the surface layer of glass affected with crizzling will be given.[5,6]

Another application concerns the utilization of the OCT imaging for examination of multilayered structures on glass support like paintings on glass, photographs and similar collage techniques. First example of this kind will be a 19th c. glass window painted with annealed colors.[2] In this case the thickness of color glass may be determined even if this layer is opaque for light used for the examination. This was possible by a additional examination through the whole glass support – the unique method available only for the transparent base. Another example to be presented is late 19th c. photographic collage.[6] This item is composed of the black and white photograph glued with its front side to the partially painted glass plate. Delamination of the glass-paper structure and splitting of the glass caused by a contraction of the animal glue used may be conveniently inspected with aid of the OCT technique.

REFERENCES

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