

## TRACKING CANVAS DEFORMATION WITH OCT – METHOD AND POSSIBILITIES

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The main application of optical coherence tomography (OCT) is non-contact and non-destructive imaging of stratigraphy of semi-transparent objects. In conservation practice, it permits investigating the arrangement, continuity and thickness of varnishes and glaze layers. Nevertheless, even if the painting structure is non-transparent to the light used for examination, OCT may still be used for profilometry of its surface. One of possible applications of this approach, used for tracking distortions of the painting's surface caused by climatic changes in its surroundings, will be presented.

The research project applying Spectral domain OCT for profilometry combined with marker position tracking as well as experimental set-up designed for this application by the Institute of Physics in collaboration with the Institute for the Study, Restoration and Conservation of Cultural Heritage of Nicolaus Copernicus University will be described.

On examples of experiments carried out on model paintings it will be shown that the method is capable of continuous monitoring simultaneously in- and out-of-plane deformations of the painting surface in response to environmental fluctuations with micrometer precision. One of major advantages of using the OCT for this application lie in the absence of problems characteristic for optical methods relying on measurements of phase differences, such as phase ambiguity and phase unwrapping. Moreover, the method is suitable for *in situ* and long-lasting examination since it is not sensitive to micro-displacements of the investigated object with respect to the measuring head.

The current research project utilising SOCT aims at the gathering detailed data for a better understanding of the relationships between the painting technique employed, the age and storage conditions of the painting, and its susceptibility to dimensional deformation influenced by fluctuations of relative humidity and temperature, as well as quantifying the range and direction of the changes. To interpret processes taking place in the structure of the painting and the role of particular components in the behaviour of the overall structure, model paintings prepared using different techniques, and samples at different stages of preparation are being examined with the SOCT in conditions designed according to climate parameters usually experienced in museums and historic interiors.