

## Optical coherence tomography for monitoring of the laser cleaning of ceramic tiles

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Ceramic artifacts from archeological sites suffer from a vast range of deterioration phenomena, some of which are occurring in glaze layers. Such problems, caused mainly by long exposure to environmental factors, are: cracks, delaminations, pitting, all eventually resulting in formation of losses within the glaze. Also surface dirt and old conservation coatings contribute to the complexity of present conservation issues. Cleaning of such objects is both difficult and controversial, since most conservators believe that the corroded glaze layer should not be removed.

The aim of this work was to evaluate the applicability of Optical Coherence Tomography for monitoring of laser removal of unwanted dirt and secondary layers. A group of medieval ceramic tiles with various deterioration problems (both fragments and whole preserved tiles) from the collection of the District Museum in Toruń were chosen.

Optical Coherence Tomography (OCT), the technique of non-invasive imaging of transparent and semi-transparent layers was employed to monitor the state of glazes before, during and after laser cleaning trials. The laser used was Nd-YAG Thunder Art system from LightForArt (El.En. S.p.A.).

In the presentation OCT cross-sectional images of both fragments and preserved historic tiles before, during and after laser cleaning will be shown to examine the process of removal of surface deposits as well as mid-twentieth century conservation coatings. In case of some of the ceramic fragments (donated to science) the destruction of the glaze layer after a few steps of laser cleaning was induced intentionally and then visualized with OCT.

The experiments performed confirmed that OCT is a suitable monitoring tool for laser cleaning of semi-transparent glazes on historic tiles, as well as enabled to define specific risk factors for these objects, such as preexisting cracks or delaminations within the glaze layer.

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