IN-SITU ANALYSIS OF CORROSION LAYERS OF HISTORICAL GLASS OBJECTS BY 3D MICRO-XRF

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The investigation of diffusion processes can give insights into the aging mechanisms of glass artefacts. In order to obtain concentration profiles of mobile elements, like potassium and calcium, the method of choice should be non-destructive. In this presentation we will show that 3D micro X-ray fluorescence spectroscopy (Micro-XRF) is such an analytical tool suited for depth profiling. We applied 3D Micro-XRF onto two types of glasses which underwent different kinds of diffusion processes.

Diffusion due to storage in earth: The glass panel of a sigma shaped table has recently been discovered by archeologists in Caesarea, Israel. It belongs to a palace which was burned in the seventh century AD and is believed to date to the fifth or sixth century AD. Due to the long burial in the earth, corrosion processes have taken place. The panel is manufactured of different gold-glass pieces. A selection of samples was investigated to compare color and aging mechanisms.

Diffusion due to paint layers: "Reverse painting on glass" comprises a special technique of preparation: glass plates were directly painted with oil- or resin-containing colors. Due to the fact that acidic materials cause glass corrosion it is assumed that certain binding media may initiate corrosion processes beginning at the interface glass/binding material. This leads to "loss of adhesion" inside of reverse-glass paintings, eventually destroying completely the decoration of the glass objects. As an example two different reverse paintings on glass from the 16th and 19th century have been investigated.

First results of depth-profiling on the artefacts will be presented.