

Protrusions in a painting of Max Beckmann examined with confocal XRF

R. Simon¹, W. Faubel², H. Becker³, W. Schmidt⁴

1) Forschungszentrum Karlsruhe GmbH, ISS, Karlsruhe, Germany

2) Forschungszentrum Karlsruhe GmbH, IFG; Karlsruhe, Germany

3) Kunsthalle Mannheim, Mannheim, Germany

4) Landesmuseum für Technik und Arbeit, Mannheim, Germany

The formation of metal soap aggregates in the ground layer is a severe conservational problem affecting hundreds of oil paintings throughout the world [1]

These aggregates are forming blisters and protrude through the paint layer to the surface.



Consequently small crater-like holes are formed on the surface of the painting, and in the end of the process the surface layer is partially destroyed. These damages have been reported and analyzed in paintings spanning the 16-20th centuries[2] but recently also damages were found in pieces of the Classic modern art of the early 20th century. Max Beckmann's "Pierette and Clown" (figure) belongs undoubtedly to the major works in the collection of the Kunsthalle Mannheim. Affected pieces of the ground layer have been examined by confocal synchrotron radiation micro-X-ray fluorescence (CSR μ XRF) in order to get compositional and spatial distribution information about the components and their behaviour.

The CSR μ XRF measurements were conducted at the FLUO beamline of the ANKA synchrotron radiation source in Karlsruhe, Germany. The analyzed samples of the unpainted ground layer consisting of zinc white and barium sulphate comprised several bulges resembling small blisters, presumably protrusions in the nascent state. CSR μ XRF measurements showed that these blisters have a high concentration of Zn in the center with surrounding layers of Ba and Sr. Relatively small amounts of Pb have been recorded, the role on Zn and Pb in the formation of protrusions will be discussed.

[1] J. van der Weerd, A. van Loon, J.J. Boon, *Stud. Conserv.* **5**(2005)3

[2] M. Cotte, E. Checroun, J. Susini and P. Walter, *Applied Physics A*, **89**(2007)841