

X-ray Powder Microdiffraction: Useful Tool in Investigation of Wall Painting Layers

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Identification of inorganic and organic compounds in colour layers helps in dating and restoring of historical paintings. X-ray powder microdiffraction (micro-XPRD) extends the possibilities of traditional optical microscopy and SEM/EDX used in microanalysis of mineral pigments in fragments of paints. Laboratory diffractometers with monochapillary primary optics and x,y,z-stage are now available for a routine analysis of 0.1 mm large samples, heterogeneities in fragments and colour layers in cross-sections with a roughly flat surface. Resulting diffractograms usually need no pre-treatment before their search-match analysis.

As an example, measurements of the top green layer in a sequence of colour layers in wall paints from the Plasy Monastery, Czech Republic, are shown. The sample was measured both in Bragg-Brentano geometry and micro-XPRD, and quartz, albite, celadonite, chlorite, calcite, and gypsum were found. Micro-XPRD showed that chlorite and quartz are a contamination from the sand used in plaster. Micro-XPRD also revealed that gypsum is a part of the salt efflorescence on the outer surface. Micro-XPRD identified celadonite as a green pigment in colour layer that would not be possible using spectral methods.

Keywords: micro-XPRD, mineral pigments, paintings