



## The Comparative Study of the Painting Materials of a Series of Orthodox Icons on Wooden and Glass Support from Transylvania

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### Abstract

In Romania and especially in Transylvania the process of creating icons implied the use different supports, mainly wood and glass. Samples have been collected from various areas of these religious artefacts. The analyses carried out were FTIR spectroscopy and mass spectrometry; they have helped to identify the pigments and binders specific for the technique of execution. The information obtained through these procedures is part of the identification elements of the icons' period and school, and in the end it contributes to the technical expertise of these artefacts.

### Introduction

There were selected samples from four different icons on glass and wooden support and from different cultural areas. The aim is the identification of the pigments, binders and the ground compound, for a further comparison with the libraries data and also based on the research group experience [1], for an appropriate expertise of the icons concerning the origin and the conservation status. The samples were collected from representative areas of each icon, as harmless as possible for the general aspect of the picture (spots measuring about 0,5 mm in diameter) and exploiting an existing degradation (f.e. cracks) of the painting layer [2, 3].

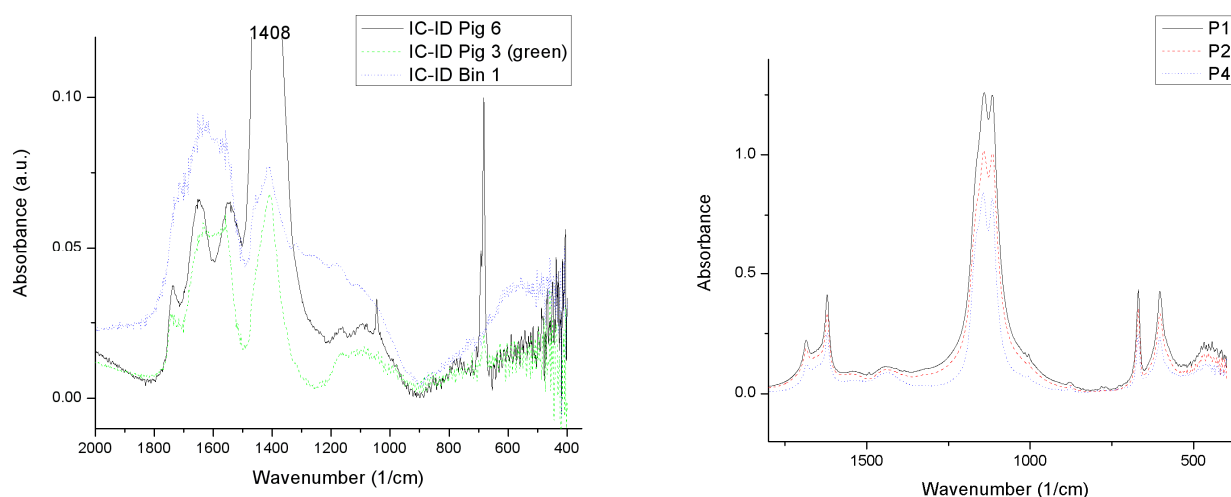


Fig.1, 2; FTIR spectra: “Invierea Domnului” icon (glass support), on left; “Altar” icon (wooden support), on right

### Materials & Methods

MS spectra were registered from the samples collected from the mentioned icons. The usual quantities for these analyses were about 0.5 mg or less. The experimental conditions were:  
Instrument: Mass Spectrometer Finnigan Mat 311 with direct introduction inlet system. The sample

were heated from 25 °C to 325 °C programmed with 25 °C /min. In all this time, mass spectra were registered in continuous mode. The compounds were identified by comparison of the obtained mass spectra with the spectra from existing libraries data.

IR spectra were obtained with a JASCO 6100 FTIR spectrometer using KBr pellet technique in the 4000 to 350 cm<sup>-1</sup> spectral range with a resolution of 2 cm<sup>-1</sup> [4].

## Results

From the analysis of the icons on glass support the following materials were identified: proteins, fatty acids (palmitic and stearic ones), inorganic pigments: white (Pb –carbonate), green (Cu-carbonate Cu CO<sub>3</sub>. Cu(OH)<sub>2</sub>, red (Fe-oxide), ochre [FeO(OH).H<sub>2</sub>O] and black (Fe -oxide). In the case of “Sfintii Imparati” icon the following pigments were identified through FTIR spectroscopy: blue (lazurite), white(Pb-carbonate), ochre (jarosite), red (Fe –oxide) and black (Fe-oxide). As concerning the binder, protein was identified also (Fig. 1, 2).

In the case of wooden support icons the identified components were: ground (gypsum), pigments (blue, green, white, red and black) and binders (fatty acids, C16-C18, Fig.3). In the case of “Altar” icon were identified pesticides used probably for the former icon conservation, i.e. for insects.(Fig.4) From the MS spectra were identified superior alcohols and chlor compounds.

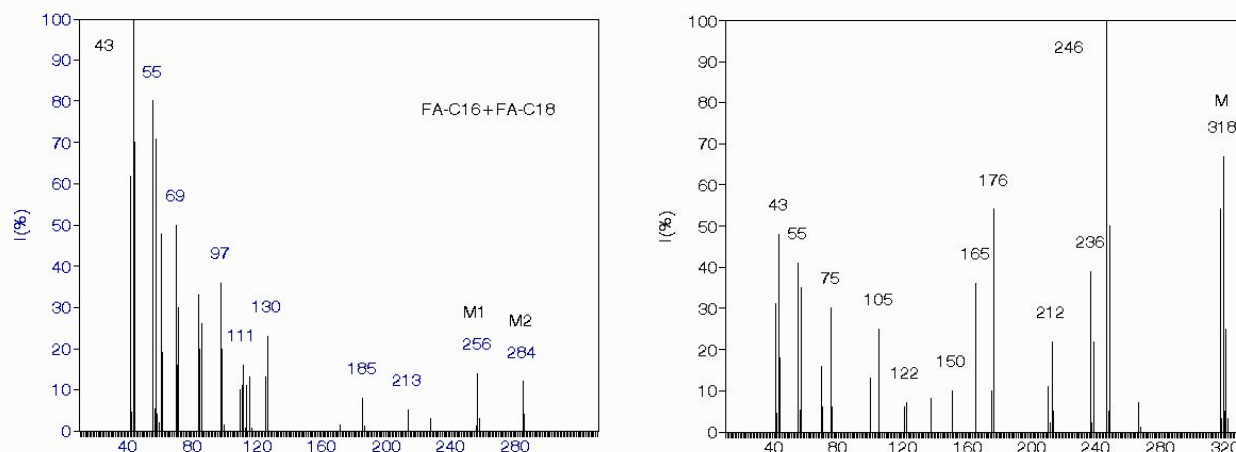


Fig.3, 4; Mass spectra of: C16 (M1) and C18 (M2) fatty acids on the left, of pesticide (DDD) on the right

## Conclusions

The information obtained through the mentioned procedures confirms the oral tradition about technical execution of the icons from different centres and becomes an element for identification of the school or local workshop.

They were identified former interventions of conservation, significant data for further restoration of these icons.

## References

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