



Painting Materials Analysis of the “Sf. Nicolae” Church-Farcasesti, Gorj, Romania

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Abstract

St. Nicolas Church from the Pesteana de Jos village, Farcasesti commune, Gorj county, Romania was built between 1705-1709 and rebuilt in 1806, being one of the country’s historic monuments. The painting materials used in this church have been analyzed with the Fourier Transform Infrared Spectroscopy (FTIR spectroscopy), atomic absorption spectroscopy and thin layer spectroscopy in order to identify and analyze the used paint.

Introduction

The “Sfântul Nicolae” (Saint Nicolas) Church – Pesteana de Jos parish (Fig. 1) was built in year 1806 according to the inscription from the prothesis (schenofilachion) [1]. The painting combines the traditional iconography with influences from the post-bysanantine art, transformed into an art with it’s own, specific Romanian features, and it was realised by local painters. [2].

Fourier Transform Infrared Spectroscopy (FTIR) is a powerful tool used to identify organic and inorganic chemicals in analysis of wall painting materials [3]. The aim of this research is to identify and analyze the chemicals from paints used in painting from “Sfântul Nicolae” church.



Fig.1; “Sf. Nicolae” church



Fig.2; Sample area

Materials & Methods

Samples have been taken from the damaged areas of the painting presented in Figure 2, which were analyzed through the FTIR spectroscopy and atomic absorption spectroscopy. IR spectra were obtained with a JASCO 6100 FTIR spectrometer using KBr pellet technique in the 4000 to 350 cm⁻¹ spectral range with a resolution of 2 cm⁻¹ [3]. The AA analysis has been realized using Aldrich standard solution (Cu, Cd, Pb, Ni, Zn, Co, Cr, Fe, Ca) and p.a. Merck reagents (HNO₃, HCl, H₂O₂, H₂SO₄). The separation and identification of the metals from the samples of solvated pigments into mineral acids was realised on cellulose plates, using several mobile phases and specific visualization reagents.

The classification of the wavenumbers of absorbed IR radiation by the investigated painting were investigated using hierarchical clustering techniques (between wavenumbers linkage as clusterization method, squared Euclidian distance as metric), SPSS 18.0 software. Moreover, the wavenumbers of absorbed radiation by the investigated painting were compared with online library of known compounds in order to identify the composition.

Results

The results obtained from the analysis show that the painting is a fresco in which the pigment is suspended in water with lime. The pigments used and identified through the three methods are: iron natural red (fig. 3), ultramarine (fig. 4), iron ochre (Fe_2O_3 , H_2O), cinnabar, lime white. The classification of wavenumbers in red and blue samples extracted from the investigated painting is graphically presented in Fig. 5. Five classes were used to classify the wavenumbers.

One wavenumber proved to be distinct as length and proved not being similar with any other compound in both red and blue samples (in both cases it was the compound with highest wavenumbers). On the second step of classification two linkages were observed for both red and blue samples. The linkage was furthermore similar for red and blue samples, another two steps being necessary until the linkage of all wavelengths (Fig. 5).

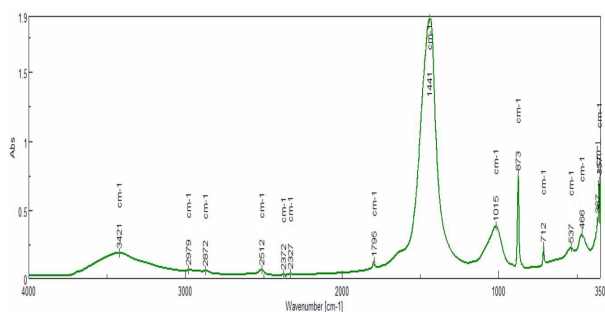


Fig. 3; FTIR spectra: iron natural red (sample)

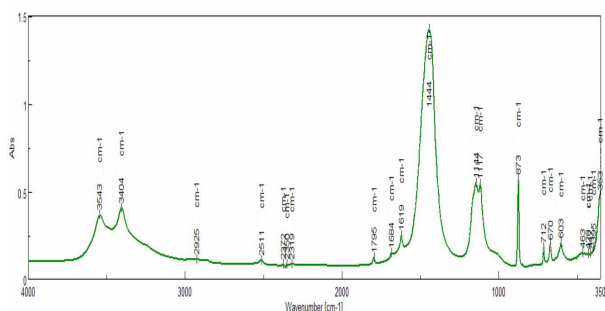


Fig. 4; FTIR spectra: ultramarine (sample)

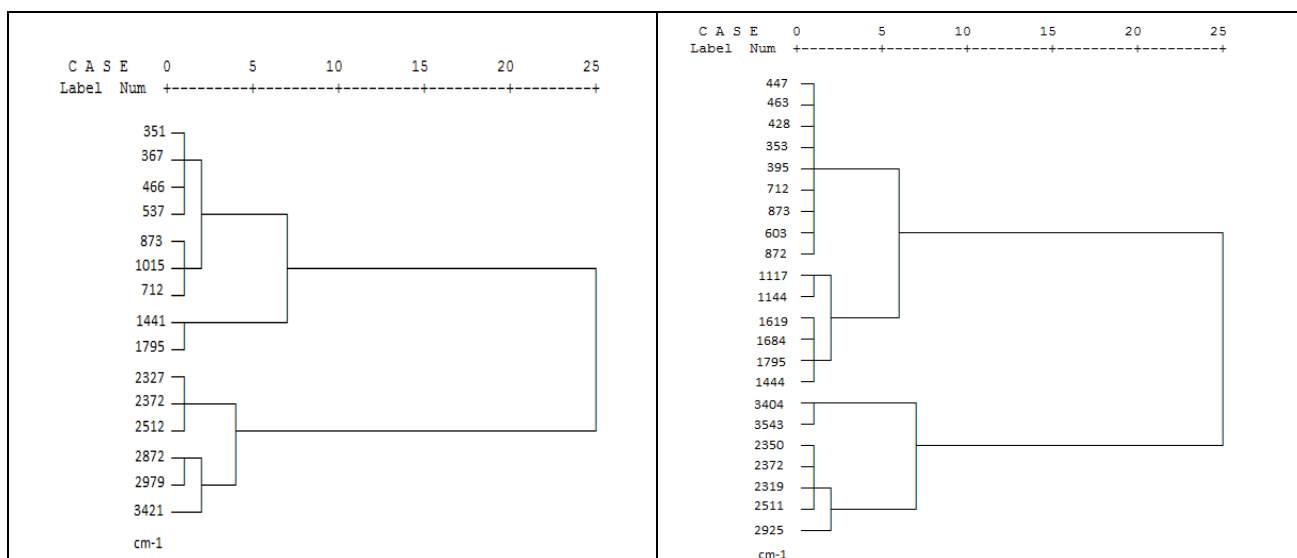


Fig. 5; Average linkage: Dendrogram on red (left) and blue (right)

Conclusion

The obtained informations are confirming the procedures employed for painting Orthodox Churches from the north of Oltenia, Romania, namely the method and the materials used, the basic colours being ultramarine, natural red earth and iron ochre.

References

- 1) M. Păcuraru, *Istoria Bisericii Ortodoxe Române*, vol.II, ediția a 3-a, Ed.Trinitas, Iași, (2006), 198, ISBN 9739130186
- 2) A.Panoiu, *Pictura votiva din nordul Olteniei*, Ed.Meridiane, Bucuresti, (1968), 7-16.
- 3) C. Măruțoiu, I. Bratu, A. Trifa, M. Botiș, V. C. Măruțoiu, FTIR Analysis of painting materials from the church Saint Paraschiva of Poienile Izei, Maramureș, Romania, *Int.J.Conserv.Sci.*, 2 (1), (2011), 29-35.