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Conservation and Restoration of Deteriorated Greco - Roman Organic Dedicatory Panels in Atfiyah Museum Store – Egypt Applied on a Chosen Object

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Abstract: Egypt is famous of its Greco – Roman heritage especially dedicatory panels which were made or carved of stone but it was found very unique colored dedicatory panels which were made of wood covered with textile and had colored view from wood in the surface, these dedicatory panels were very weak and deteriorated, the textile was lost in many places and fragile in the other ones, the wooden panel was very weak also because of the Biodeterioration factors (Fungi and insects), samples were taken from the wooden panel and textile to identify them, also samples from the red, yellow and black pigments were taken and analyzed with the elemental analysis unit attached with Scanning Electron Microscope (EDAX), biological swabs were taken also to identify the microorganisms which grew on the panel. After the identification of the materials, Restoration processes were started, first the dust and the dirties on the surface were cleaned, then, the consolidation with Klucel - G with concentration 4% dissolved in ethyl alcohol, after that, the loss in the wooden panel was completed, the dedicatory panel was ready for the display or storage in the museum, all of these processes will be presented in this research with pictures to explain the restoration processes of this unique dedicatory panel.

Keywords: Dedicatory Panel, Textile, Wooden Panel, Colored View, EDAX, Klucel-G

1. Introduction

The Dedicatory panels were used in Ancient Egypt through the ages, first, they were made from stones and after that made from organic materials like wood. The artistic features of the Greco – Roman dedicatory panels impressed from the ancient Egyptian art in representing the Egyptian gods and goddess like: Anubis and Osiris. The dedicatory panels also included the name of the dead.

1.1. The History and Artistic Description of the Selected Tombstone

The selected dedicatory panel is one of seven dedicatory panels were found in Shawaf excavation site in Saqqara – Egypt and transported from Egyptian museum in Cairo to Atfiyah museum store for restoration, they belonged to Greco – Roman period in Egypt.

- *Number of tombstone in the archaeological records:* 2/17. (Figure 1).

- *The Artistic description of the selected tombstone:* rectangular wooden plate covered with linen warps and had colored wooden layer fixed on it representing an Egyptian goddess raising one of its hands and holding the life key in the other hand.

- *The selected dedicatory panel's size:* 50 cm × 32cm.

Figure 1. *Shows the selected dedicatory panel.*

1.2. Deterioration Factors of the Selected Tombstone

-Dust and dirties on the surface.
- Big loss in the textile warps.
- Wooden panel's weakness.
- Colored view layer's weakness.
- Textile layers ' weakness.

2. Methodology

Many samples were taken from the wooden panels, textile warps and pigments from the wooden view on the surface to identify the type of wood, textile and pigments.

2.1. Wood Identification

The wood's sample was examined by the optical microscope to know its type. (Figure. 2).

2.2. Textile Identification

Sample was taken from the textile warps and examined by Scanning Electron Microscope (SEM). (Figure. 3-4).

2.3. Preparation Layer and Pigments' Type Identification

Samples were taken from the preparation layer (Gesso layer) and analyzed by X-Ray Diffraction analysis to know its component and (FTIR) analysis to know the type of medium of the preparation layer. Also, samples were taken from black, yellow and red pigments to know their components and types by (EDAX) unit attached with Scanning Electron microscope, X-Ray Diffraction analysis and FTIR to know the medium of the pigments. (Figure. 5-11).

2.4. Identification of the Textile's Resin

Sample was taken from the resin on the textile's surface and analyzed by (FTIR) to identify it; the resin is (Animal glue), it became dark because of the decay of organic resins through the ages. (Figure. 12).

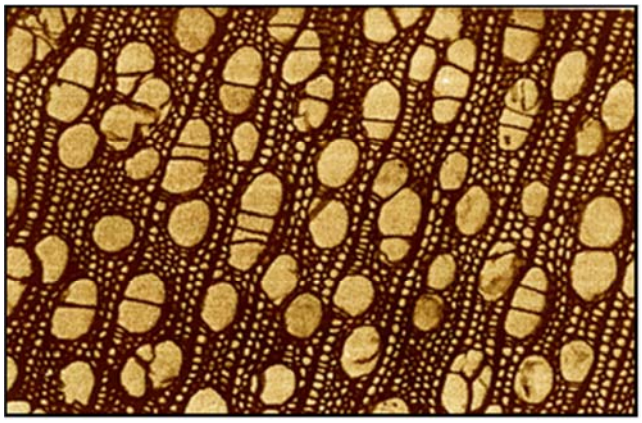

Figure 2. *Shows the wood's sample under the optical microscope.*

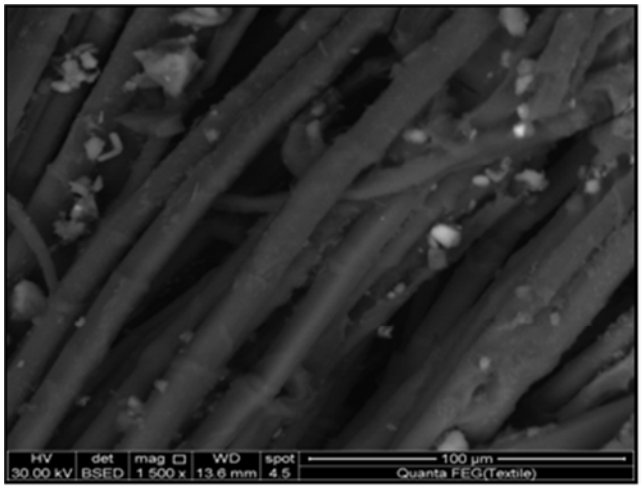

Figure 3. *Shows the textile's sample examination (Scanning Electron Microscope) (1500x mag).*

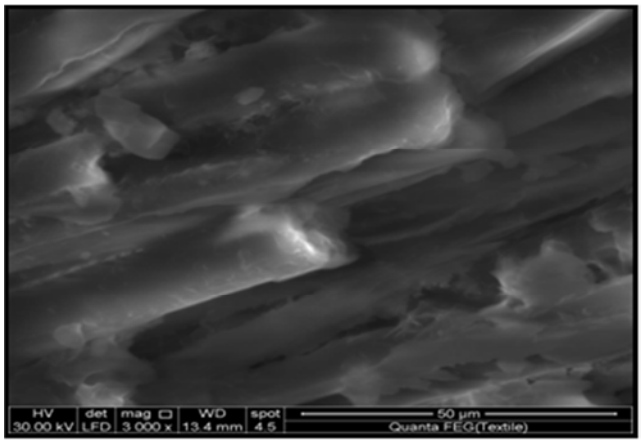

Figure 4. *The previous figure with another magnification power (Scanning Electron Microscope) (3000x mag).*

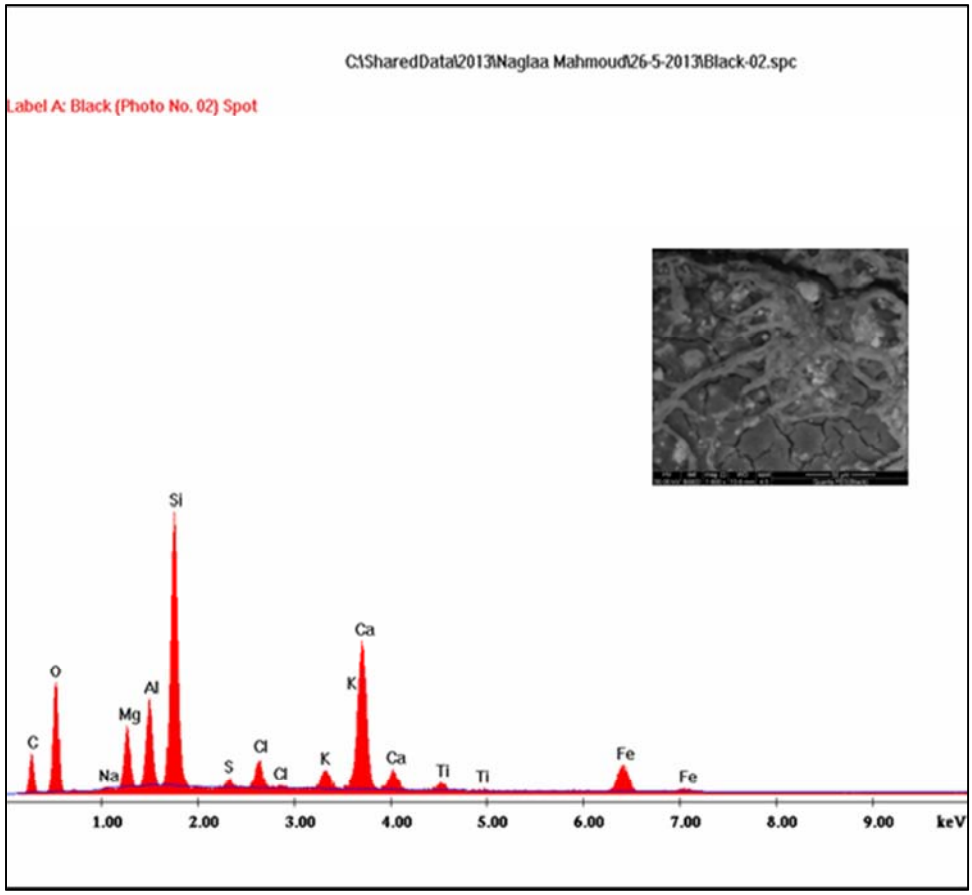

Figure 5. *Shows the yellow pigment identification by EDAX.*

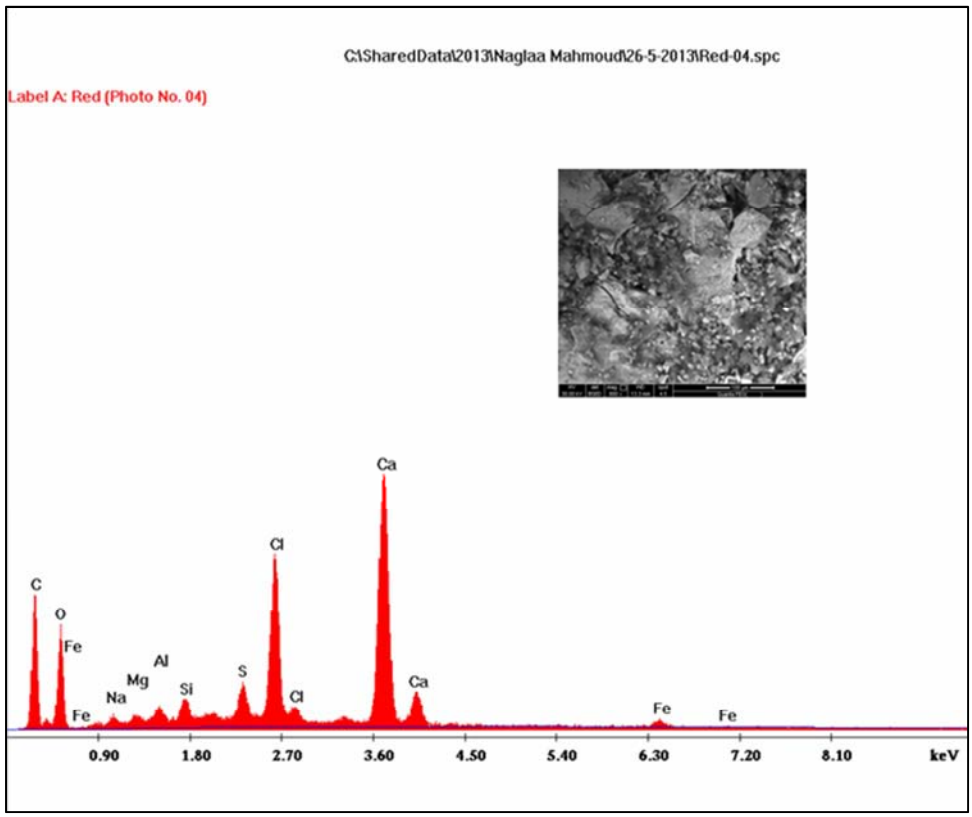

Figure 6. *Shows the red pigment identification by EDAX.*

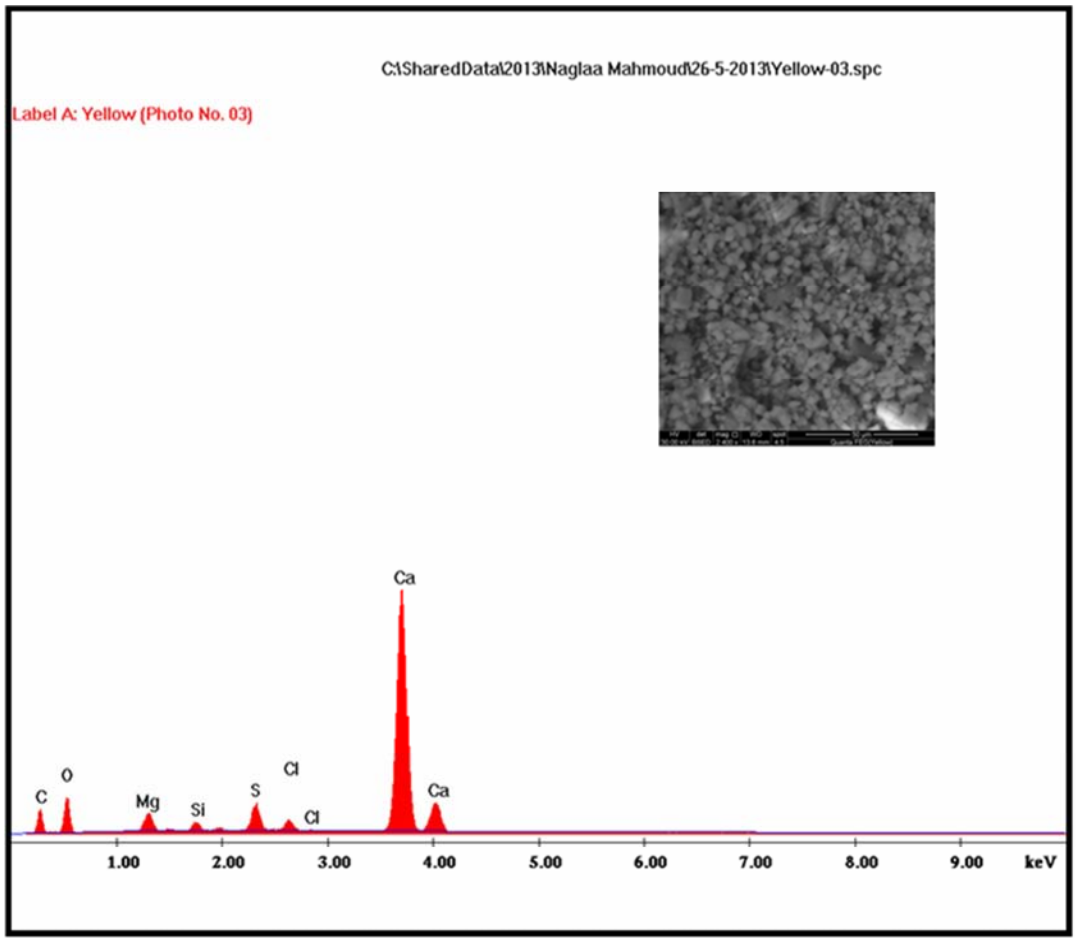

Figure 7. *Shows the black pigment identification by EDAX.*

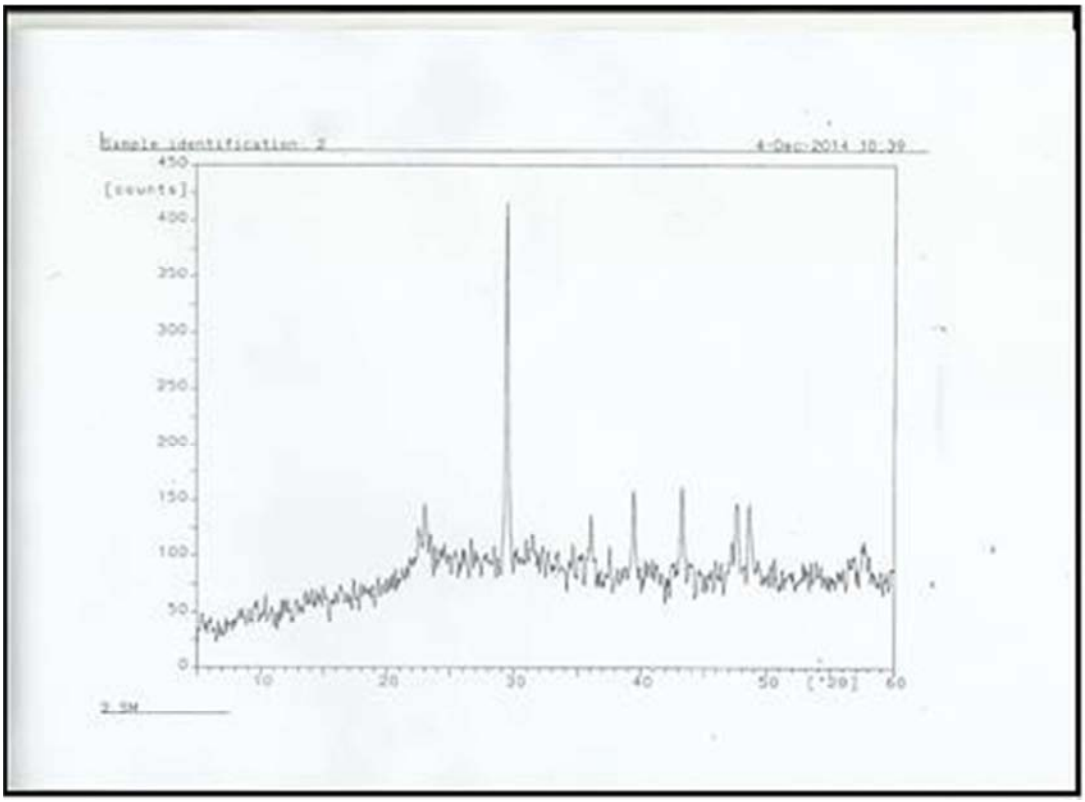

Figure 8. *Shows x-ray diffraction pattern of the yellow pigment.*

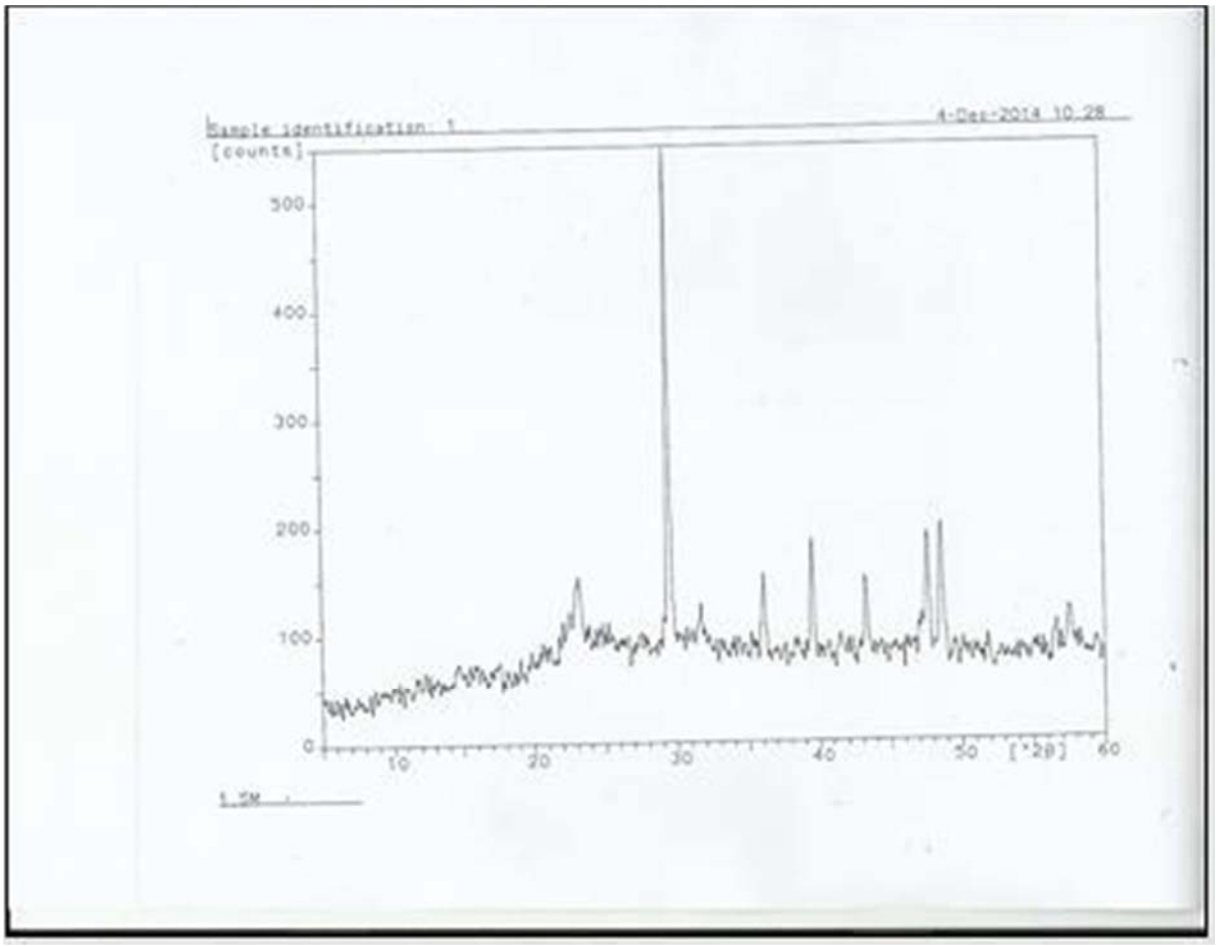

Figure 9. *Shows x-ray diffraction pattern of the red pigment.*

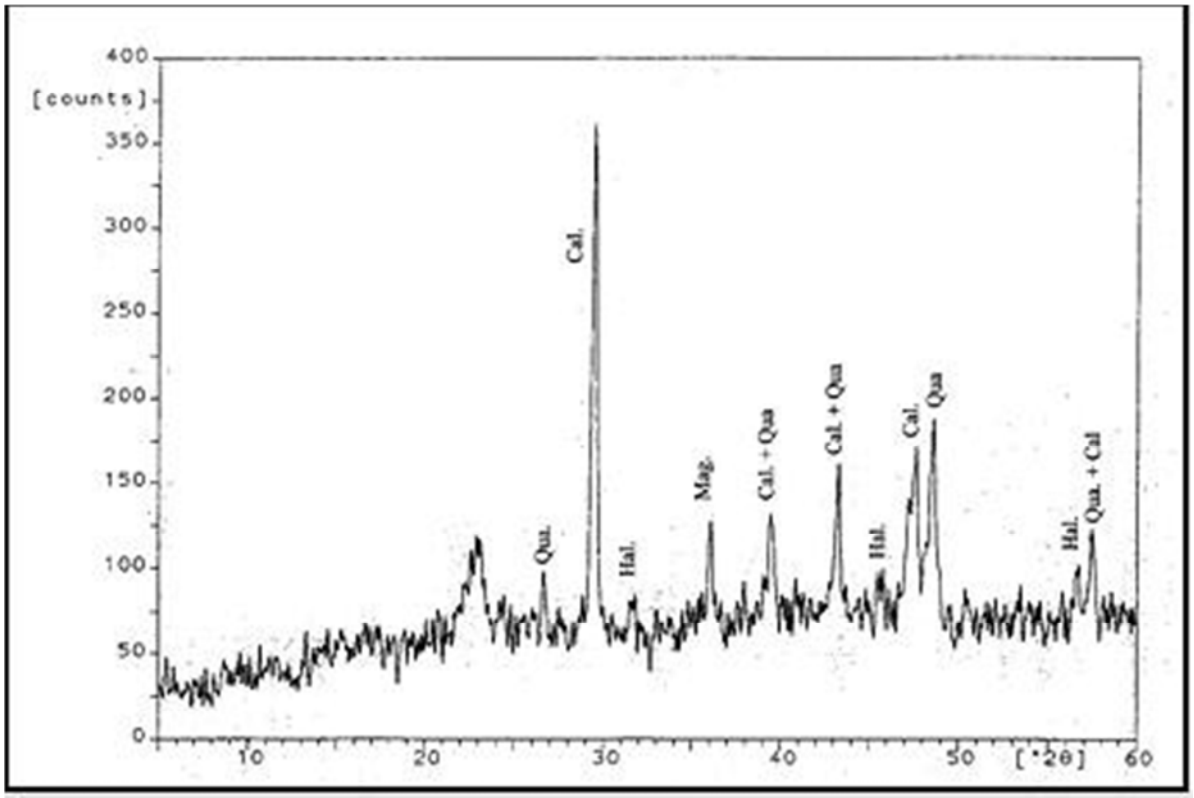

Figure 10. *Shows x-ray diffraction pattern of the preparation layer.*

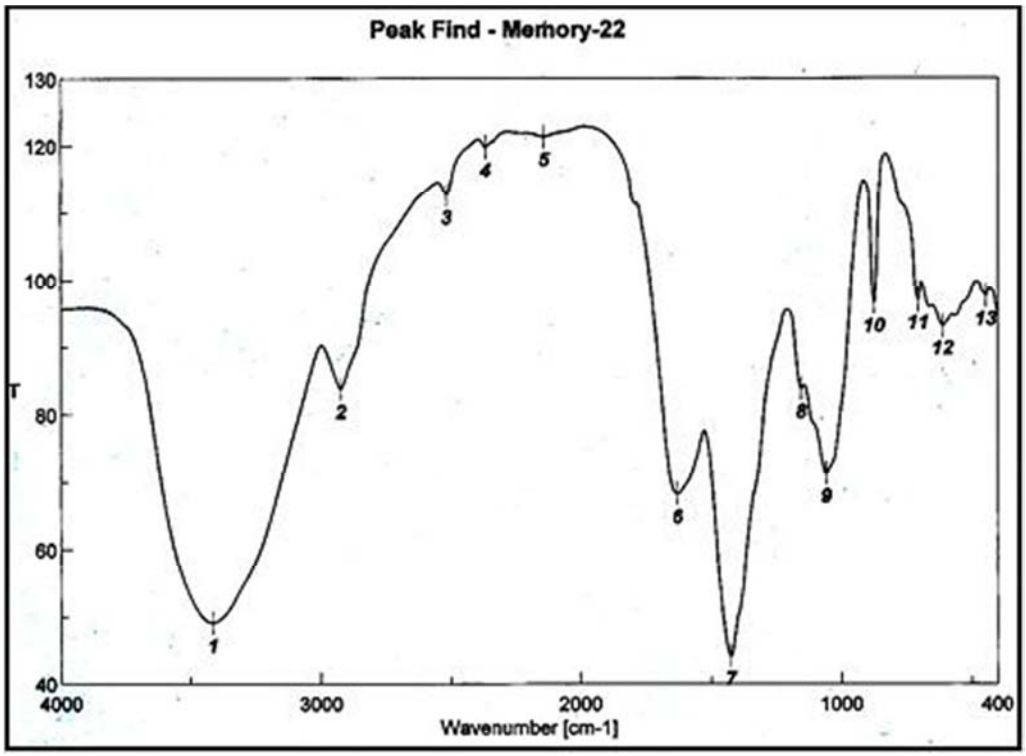

Figure 11. *Shows the analysis of the preparation layer's medium by FTIR.*

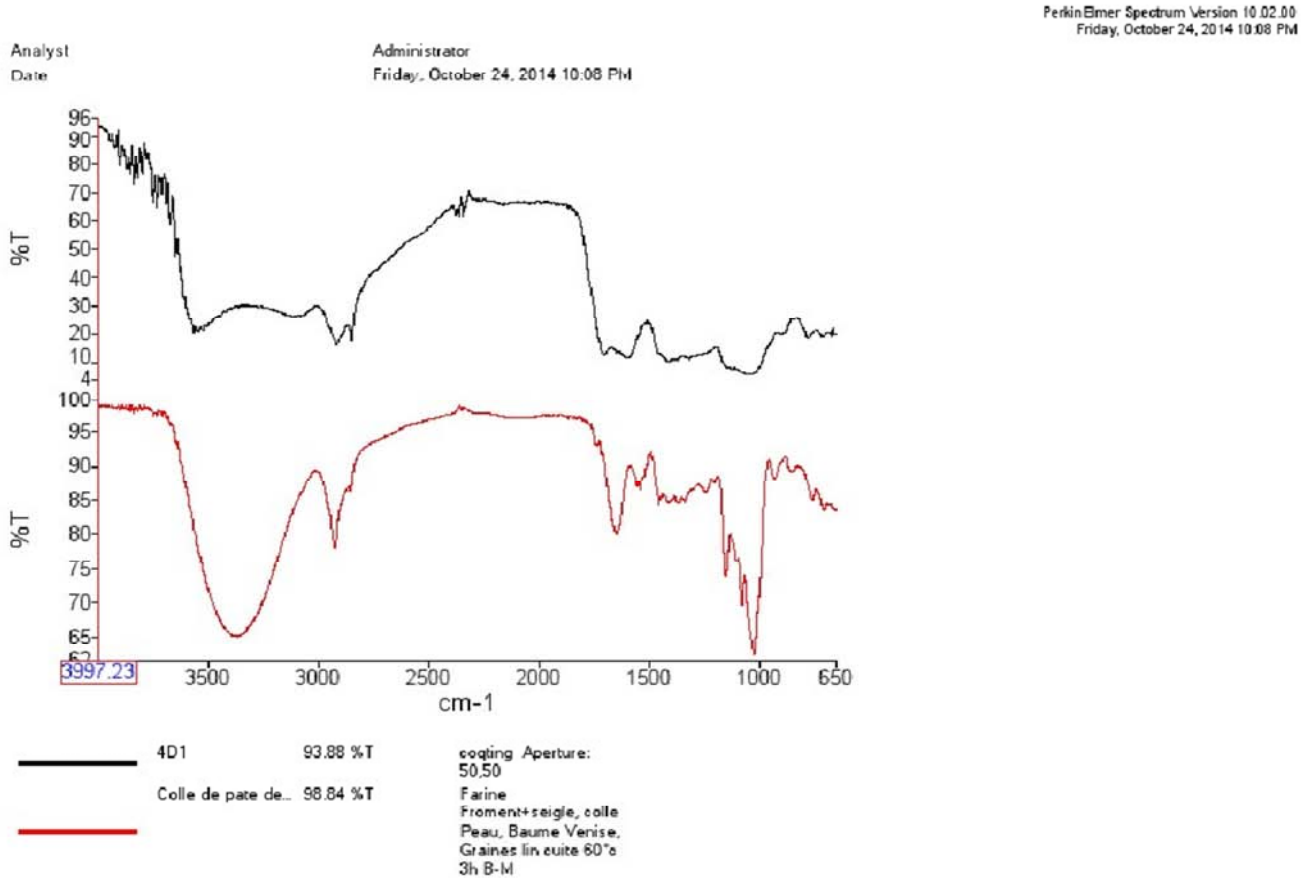

Figure 12. *Shows the analysis of the textile's resin by FTIR.*

2.5. The Restoration Processes of the Selected Dedicatory Panel No. 2/17

Before the restoration of the selected dedicatory panel, Foam panel was made to save it during the restoration processes. (Figure.13).

2.5.1. Cleaning Processes

Dust and dirties were cleaned mechanically by brushes and scalpels, the remains of them were cleaned chemically by a solution of ethyl alcohol and water 1:1, the colored part on the surface was cleaned chemically by ethyl alcohol only without water to save the pigments, ethyl alcohol is an antiseptic solvent for the microorganisms growth.(Figure. 14-15).

2.5.2. Consolidation Processes

The selected object was consolidated by Klucel – G dissolved in Ethyl alcohol in percentage 3% to consolidate the colored part and all the dedicatory panel' parts. (Figure. 16).

2.5.3. Loss- Compensation Processes

The loss of wooden panel was completed by cotton saturated with Paraloid B- 72 dissolved in acetone 10% in the inner part, the outer part was completed by Glass Microbaloon with Paraloid dissolved also in acetone 10%, the paste was mixed with brown pigment reasonable to the original part color.(Figure. 17-19).

Figure 13. *Shows the foam panel which was made to save the dedicatory panel during the restoration processes.*

Figure 14. *Shows the chemical cleaning of the colored view's surface with ethyl alcohol.*

Figure 15. *Shows the dedicatory panel after the cleaning processes.*

Figure 16. *Shows the consolidation processes of the dedicatory panel with Klucel –G.*

Figure 17. *Shows the loss compensation of the inner part of dedicatory panel with cotton saturated with Paraloid B-72.*

Figure 18. *Shows the loss compensation of the outer part of the dedicatory panel with brown pigment mixed with microbaloon.*

Figure 19. *Shows the selected dedicatory panel after restoration processes.*

3. Results and Discussion

From the examination and analysis of the samples taken from the selected dedicatory panel, the results were as shown:

The wood's type of panel is willow wood, sources of the yellow and red pigments are iron oxides and the black pigment is carbon particles. The medium of the pigments is Arabic gum, the preparation layer' components are Calcite as an essential component, Quartz, Magnetite and Halite, the medium of this layer is also Arabic gum. The resin of the textile is animal glue. (Table 1-5).

Table 1. *Shows the components of yellow pigment (EDAX).*

El.	In.%
C	43.98
O	27.74
Na	1.40
Mg	1.05
Al	1.36
Si	1.47
S	1.87
Cl	7.06
Ca	13.22
Fe	0.85

Table 2. *Shows the components of red pigment (EDAX).*

El.	In.%
C	21.81
O	31.59
Na	0.23
Cl	31.59
Mg	0.23
Al	5.86
Si	17.25
K	1.33
Ca	23.54
Ti	0.71
Fe	4.16
S	0.58

Table 3. *Shows the components of black pigment (EDAX).*

El.	In.%
C	19.58
O	34.93
Mg	3.24
Al	5.86
Si	17.25
S	3.31
Cl	1.39
Ca	36.14

Table 4. *Shows the components of red pigment (X-Ray Diffraction).*

Component	In.%
Calcite	71.32
Feroxyhite	17.33

Table 5. *Shows the components of yellow pigment (X-Ray Diffraction).*

Component	In.%
Calcite	60.2
Feroxyhite	15.23
Magnetite	9
Wuestite	15.53

4. Conclusion

The selected dedicatory panel is one of seven panels were used for the purpose of dedication and contained views of ancient Egyptian gods and goddess like: Anubis and Osiris, also they contained the names of their owner in some cases, they had various materials like: wood, textile, pigments, resins as mediums and varnish. They exposed to various deterioration factors which affected badly on the organic materials and they need to be restored and conserved, this research sheds the light on one of the seven dedicatory panels from Greco – Roman period in the Egyptian history, it's recommended to provide the ideal environment of preserving to save this precious culture heritage to the further generations.

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