



## 1: Abstract

European Artistic style prevailed at the era of Muhammad Ali family, For example Baroque and Rococo decorative styles and Scagliola that has spread widely in Europe in the fifteenth century. in Egypt we can find this style in the Royal jewelry Palace at Alexandria, Champollion palace and sabil "um Abbas" at Saliba Street -Cairo 1867 A.D. The three examples Simulator Natural Marble. Scagliola style implemented in the tomb of the royal family 1805 A.D. at El Imam El Shafie area , in addition to the other stucco works, perforated Windows and gilded stucco. The study was performed in the tomb of the royal family 1805 A.D using various analytical methods such as X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM) with EDX unit. The data showed that scagliola carried out on two layers the under layer and other surface layer that gives feel similar to natural stone(marble). The under layer components mainly gypsum, Anhydrite, calcite and dolomite in addition to a small percentage of halite salt. EDX analysis confirm component of colored layer zinc oxide ,gypsum, calcite, iron and aluminum oxides.

## 2: Results and Discussion

- <sup>1.</sup> Scagliola Carried out on two layers suport layer and upper layer that contain colors simulating marble. 2. suport layer Consists of gypsum ,dolomite and calcite.
- Upper layer that contain colors Consists of White zinc mixed with iron, aluminum oxides and carbon to simulate marble.

Suport layer fig(3) consists of five minerals Gypsum 50% after included the proportion of about anhydrite within because it consider one of the gypsum phases this phase the cause of separation the surface layer.due to the difference physical properties. The total mineral dolomite and calcite about 35%, the proportion of halite salt significantly 15% which also explains peel off the outer layer as a result of salt crystal formation Pressure . The upper layer taple (2) basically white zinc oxide about 50% mixed with 32%gypsum and lime 4% Aluminium Oxide a little bit of iron oxide which explains the presence of brown or reddish that simulate marble. salts halite and sylvite due to the presence of chlorine and potassium ions

# 3: Methods & Materials







which explains the scaling and loss of this upper layer . so Scagliola Is not a type of Murals, due to its composition in basic minerals Gypsum, calcite and dolomite, which is matching with what Giorgio Torraca said.

# Identification of Gesso Scagliola in The Tomb of the Royal Family (Muhammad Ali) at El Imam El Sharpie area M. A. Hawash<sup>1</sup>& H. A. M.Afifi<sup>2</sup>

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Image (1) show General view of The Tomb of the Royal Family



Image (2) show the main entrance



Image (5) show Ibrahim Bin Muhammad Ali Tomb



Image (6) show detachment of Scagliola From the ceiling



Image (7) show detachment of Scagliola From the walls



Fig(3) The approximate percentages

of the components by XDR.





Table (2) shows the approximate percentages of the Elements in the sample A1.

100.00

100.00



Image (4) show Burial chambers Scagliola overlays on the walls



Image (9) show documentation of sample A1 on site .



Image (10) show sample A1 ender SEM

|    | Sample   | Function          | dated   | Colour           | Place        |
|----|----------|-------------------|---------|------------------|--------------|
|    | No       |                   |         |                  |              |
|    | A1       | X-ray Diffraction | 10/2/20 | white            | white Lower  |
|    |          | analysis          | 12      |                  | layer        |
|    | A1       | Examination under | 10/2/20 | Material tend to | yellow upper |
|    |          | the scanning      | 12      | yellow With red  | layer        |
|    |          | electron          |         | and brown        |              |
| 50 | 3 25     | microscope with   |         |                  | 1            |
|    | - ( P. P | EDX               |         |                  |              |

Table (1) shows the documentation of sample

#### Conclusion

- 1. Scagliola Is consider one of the Architectural stucco works.
- 2. Its Implementation Differs from other kinds as two layers support and upper one and the colors added to the upper one.
- 3. The thickness of the upper layer about .2 .5 Mm .





#### **Technique used**

X-Ray Diffraction equipment model X,Pert PRO with Monochromator

Cu-radiation (k=1.542A°) at 50 K.V., 40 M.A. and scanning speed  $0.02^{\circ}/\text{sec.}$  were used. The reflection peaks between  $20 = 2^0$  and  $60^0$ , corresponding spacing (d, A°) and relative intensities  $(1/1^0)$  were obtained. The diffraction charts and relative intensities are obtained and compared with ICDD files.

SEM Model Quanta 250 FEG (Field Emission Gun) attached with EDX Unit (Energy Dispersive Xray Analyses), with accelerating voltage 30 K.V., magnification 14x up to 1000000 and resolution for Gun.1n)

Fig(1, 3) ilustrate the component composition of the sample A1 as follows

- (Gypsum) Ca  $SO_4.2H_2O$ card (33-0311), (6-46)
- Dolomite CaMg(CO3), card (11-78)
- Halite Na Cl card (5-628)
- Calcite Caco<sub>3</sub> card (5-586) 4
- Anhydrite CaSO<sub>4</sub> card (6-226)

Table (2) EDX of the sample A1 ( Scagliola falling crust) It consists mainly of zinc oxide about 50% and the presence of sulfur, carbon, calcium, iron, aluminum, chlorine and potassium oxides.

### **5: References**

1 - Giorgio Torraca "Lectures on Materials Science for Architectural Conservation: The Getty Conservation Institute Los Angeles 2009, p48

2 - Pietro Baraldi, Laura Cannalire and Maria Perla Colombini "A Scientific and Historical Investigation of Italian Scagliola "STUDIES IN CONSERVATION 54 (2009) PAGES23-34

#### **6: Acknowledgement**

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