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" Study and evaluation of using nanoparticles of inorganic consolidants in conservation of archaeological stuccoes with application on selected objects "

A Thesis
Presented forthe fulfillment of PhD degree on conservation of Antiquities

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2016

Summary

Nanotechnology provides new concepts for the consolidation and protection of our culture heritage. In particular, inorganic consolidants nanoparticles offer a versatile and highly efficient tool to combat the main degradation processes. This research will evaluate the efficacy and potentiality of nanosized particles of inorganic hydroxides as consolidants for stucco ornaments in comparison with common chemical polymers.

The study sheds light on the components of stucco and explains three main deterioration factors of stucco: acid attack, salts, and chemical transformation of the binding materials of stucco

The study tackles all inorganic consolidants which had been used widely in conservation of stucco objects like calcium hydroxide and barium hydroxide. Which h*ave the great advantage of high compatibility with the constituting materials of the work of arts ,* the using inorganic consolidates based on nanotechnologies which overcome all preview drawbacks.

The researcher applied two detailed methods for synthesis of calcium hydroxide in laboratory and measurement its physical and chemical properties which insure more stability dispersion of calcium nanoparticles in Ethanol and 1-propanol .

All analysis results are summarized as that the stucco contains gypsum , calcite and quartz and Samples comprised of red and black filler putties were prepared using fired brick powder and coal powder, respectively. The Shellac, was found as binding medium in the colored putties.

The experimental study Results supported using calcium hydroxide nanoparticles for consolidate stucco than chemical polymers which were destroyed during aging cycle, also using the nanoparticles with the selected polymers improved its mechanical and physical properties and decreased the color change after UV aging, the applied study which was carried out on ornamental stucco on mehrab of the Ibn Ata Allah (1697 A.C.) and ornamental stucco on façade of the Al-sharif Al-mghraby mosque (1659 A.C.), located in El-Mahalla El- Kubra.