

## **An experimental study for evaluating the efficiency of consolidated materials for limestone treatment.**

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### **Abstract:**

Historical limestone surface and historical building may be exposed to many changes due to the exposure to many mechanical, Physiochemical deterioration factors Which represents a threat to our cultural heritage so the aim of this study was to preserve monuments by consolidating limestone by various consolidating materials to evaluate the efficiency of treatment process, in this study we used Nanoparticles of calcium hydroxide(NANO RESTORE), SILRES® BS OH 100 (solventless mixtures of ethyl silicates (TEOS) tetraethoxysilane) were used to improve the physicochemical and mechanical properties of the stone material, Remmers KSE 300 E ( Solvent-free stone strengthener on a silicic acid ethyl ester (KSE) base), highly penetrating, safe and easy to use, has and is resistant to high weather and ultraviolet radiation, Paraloid B72 it is a joint polymerization consisting of ethyl acrylate and methyl acrylate by 70: 30%, Produced by Rhom & Haas and commercially produced by the Italian company CTS, transparent crystals, dissolved in organic solvents, this type of polymers are characterized by high molecular weight and resistance For friction, flexibility and resistance to yellowing, Paraloid B44 copolymer resin consisting of polyethyl acrylate (PEA), PMMA and ethyl acrylate (EA), a soluble in acetone and toluene, good resistance to UV radiation, corrosion, oxidation and its resistance to external factors to some extent and the degree of its glass transition is high and adding Nanoparticles of calcium hydroxide (NANO RESTORE) to copolymer of acrylic by concentration 1: 1, treatments were evaluated by scanning electron microscopy, general appearance water repellency, compressive strength, porosimetry water absorption and Density.

### **Key Words:**

Limestone, Consolidation, Calcium hydroxide nanoparticles, Nanocomposites, Penetration, Mirovski, Immersion method.