

Application of Nano particles for the consolidation of historical gypsum decoration and artworks

Gypsum stuccoes, due to their sensitivity to environmental parameters such as moisture, temperature, air pollutants, organisms and micro-organisms and soluble salts, are always exposed to decay and crumble. Nowadays, a variety of organic and inorganic materials is proposed for consolidation of these deteriorated structures. Acrylic consolidants, for example, are very common in the consolidation of deteriorated stuccos. They are usually utilized in the forms of dispersion or real solution in an organic solvent. Throughout the time, the organic consolidants are usually prone to getting yellowish and, because of some alterations in their structures like occurring cross-links, become insoluble in common solvents. Due to low Glass Transition Temperature (T_g), organic consolidants usually adsorb dust and other aerosols; therefore, they create aesthetic problems in the consolidated surface of gypsum stuccos. However, inorganic consolidants like alkaline silicates raise other problems such as irreversibility and insolubility in prevalent solvents. The aim of this research is to use new consolidants which are more adaptable with the gypsum decoration structure. The effectiveness of the treatment is highly increased when the size of the consolidants is reduced to the nanoscale. As the size of particles is reduced, the surface area per unit volume increases. The material's reactivity is consequently enhanced since more active surface will be disposable for reactions and transformations to take place. In other words, the interface between the particles and the external environment becomes larger if the same mass of matter is divided into finer particles. Another advantage related to particle size decrease is to favor penetration through porous matrices. In this work, the effectiveness of some nanomaterials is investigated to use as consolidants for gypsum stuccoes.