

An improved electrokinetic method to consolidate porous materials - DTU Orbit (09/11/2017)

An improved electrokinetic method to consolidate porous materials

Consolidation is considered one of the major restoration treatments applied on cultural heritage. This kind of treatment is focused on to preserve the external weathered layers of stone reducing their degradation caused by external alteration agents (mainly water and soluble salts). However the consolidation using commercial products have some limitations, such as: (1) low penetrability; (2) no chemical and mineralogical affinity with the material to treat and (3) release of toxic compounds (VOCs), during the solvent evaporation. In the last years, a new consolidation method based on electrokinetic techniques was developed. This method allows filling some pores by the precipitation of an inorganic compound. As a result the method allows increasing the penetration depth of current consolidation treatments. However, this method needs to be improved since: (1) no special care is taking in controlling the pH of the solutions in contact with the porous material, which can damage it and (2) it is difficult to determine in which area the consolidation takes place. In this study an electrokinetic consolidation method, which has two steps between which the current is reversed, is proposed to solve all of these problems. The results show that the proposed treatment achieves better results in terms of penetrability and durability of current consolidation treatments, and moreover prevent that the treated material to be exposed to extreme pH values.

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