

ABSTRACT

The object of this diploma thesis was the preparation of superhydrophobic thin films by sol-gel process, in order to be used as protective coatings. This method, which is simple, low-cost and independent of the substrate, is studied on various substrates and evaluated for its protective capability on stones, which have been used for the construction of monuments culture. For that purpose, experiments were carried out to measure the contact angle, the reduction of water capillary absorption (RCA), capillary water absorption stone (RC) and reduction of water vapor permeability (RVP). Moreover it is examined the effect of the films in the color of the stone substrates and their durability to environmental factors, a wide range of pH and underwater storage. The morphology of the films was examined using scanning electron microscopy (SEM). The experimental measurements have shown that due to the formation of double-scale roughness (micro- and nano-) all substrates became superhydrophobic, with high contact angle and low sliding angle values ($170^\circ \pm 1$ and $<5^\circ$, respectively). It was observed that the porosity of the substrate affects the protective ability of the films. Furthermore, the films are flexible, durable and do not have a significant effect on the color of the samples. Moreover, in this diploma thesis is carried out a theoretical study of a potential relation between the contact angle of a surface and the drop volume.