

Optimization of the laser cleaning of rough surfaces of granitic stones used in the building heritage of NW Iberian peninsula

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Granite is the most common building stone in the NW Iberian Peninsula. As marble, granite exhibits crusts and patinas caused by its interaction with atmospheric agents and with biological activity [1]. Thus, the main conservation intervention is the cleaning. In the last years, laser ablation has been one of the most studied cleaning procedure and it has been proved more complex in case of granite than in other stone materials (i.e. marble) because of its polymineral composition, which leads to different responses under laser irradiation. In previous works, the effectiveness of various laser equipment has been found different considering the coating nature and the granite type, i.e. mineralogy, texture and especially surface roughness [2]. Therefore, it is necessary to carry out a study of the influence of the surface roughness on the laser cleaning effectiveness.

In this paper, an optimization of the process of laser cleaning of different deposits and coatings on granite stones with different finishes was carried out. Samples of a hercynian granite from NW of Spain covered with blue graffiti and gypsum black crust were cleaned using the third harmonic of a Nd:YVO₄ nanosecond laser. A careful selection of the irradiation parameters was undertaken in order to achieve an effective cleaning without damaging the granite substrate. Once these conditions were established, larger areas could be treated in order to achieve an effective and safe cleaning with minimal time consumption.

The obtained results will account to a progress in the knowledge in a field of conservation of granite cultural heritage objects.

This work was supported by BIA2014-54186-R Project; (Spanish Government, Ministry of Economy and Competitiveness). J.S. Pozo-Antonio was supported by a postdoctoral contract with the University of Vigo within the framework of the 2011–2015 Galician Plan for Research, Innovation and Growth (Plan I2C) for 2014.

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