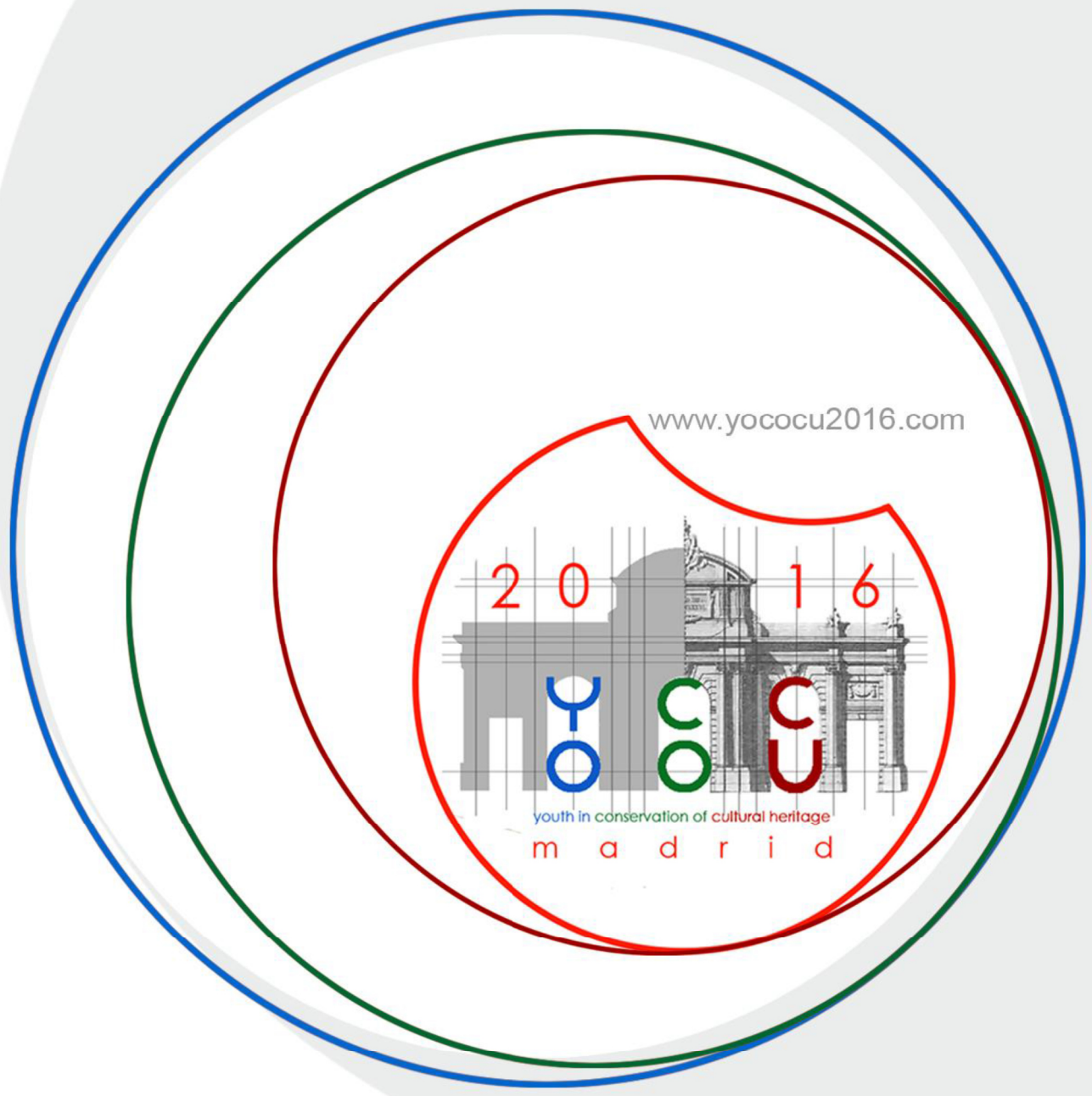


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Edited by:

Mónica Álvarez de Buergo
Beatriz Cámara Gallego
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TESTING OF NANOSTRUCTURED PRODUCTS FOR THE PROTECTION AND CONSOLIDATION OF STONE SURFACES: THE CASE STUDY OF THE TOWER OF PALAZZO ALLIATA IN PALERMO

Casarino, M.L.^{1*}; Fernandez, F.¹; Alberghina, F.²; Gallo, S.²;
Marrale, M.²; Tranchina, L.³; Brai, M.²; Livreri, P.⁴

¹Master on Nanotechnology and Nanomaterials for Cultural Heritage, University of Palermo, Italy; ²Department of Physics and Chemistry, University of Palermo, Palermo (Italy), ³ATeN Center, University of Palermo, Palermo (Italy); ⁴University of Palermo, DEIM, Palermo (Italy)

This study focused on the battlements of the Tower of Palazzo Alliata Pietratagliata in Palermo, which is one of the most important examples of late medieval civil architecture in Sicily. The battlements are made by biocalcareneite and currently affected by a strong desegregation. In order to first characterize the stone some tests have been carried out on small samples collected in situ: chemical and morphological analysis through X-ray diffractometry, scanning electron microscopy (SEM), optical polarized light microscopy (PLM), determination of total soluble salt content by measuring the conductivity and dosage of the anions and determination of the dimensional distribution of the pores.

The second step was the testing of nanostructured products for the consolidation. Indeed, since for this purpose it was not possible to take the necessary amount of samples directly from the tower, the study proceeded on the limestone of Marsala, intended as the lithotype with structural and textural characteristics similar to the one used in the battlements of the tower. On these stone samples other analyses were performed: determination of bulk (MVA) and real (MVR) density through helium picnometer, water open porosity measurement through the method of the hydrostatic balance, x-ray diffractometry, porosimetry through nuclear magnetic resonance (NMR) relaxometry and scanning electron microscopy (SEM). Moreover, after an induced aging of the specimens for simulating the desegregation of the stone, two nanostructured products for the consolidation, both based on nanosilica, have been applied. Then, two more cycles of diagnostics have been performed in order to understand the effect of the products on the stone. The results obtained through these various experimental techniques are reported and extensively discussed.



Figure 1. The tower of Palazzo Alliata Pietratagliata in Palermo



Figure 2. Detail of the stone decay