POS-B08

PD en Estrategias Científicas Interdisciplinarias en Patrimonio y Paisaje (ECIPP)

DEVELOPMENT AND APPLICATION OF INNOVATIVE ANALYTICAL METHODOLOGIES TO CHARACTERIZE BUILDING MATERIALS AND PATHOLOGIES AFFECTING THE PUNTA BEGOÑA GALLERIES (GETXO, BASQUE COUNTRY)

Cristina García-Florentino 1, Maite Maguregui 2, Juan Manuel Madariaga 1

1- Department of Analytical Chemistry, Faculty of Science and Technology, University of the Basque Country UPV/EHU, P.O.Box 644, 48080 Bilbao, Basque Country, Spain. 2- Department of Analytical Chemistry, Faculty of Pharmacy, University of the Basque Country, UPV/EHU, P.O. Box 450, 01080 Vitoria-Gasteiz, Basque Country, Spain

This PhD Project aims to develop different analytical methodologies based on the use of X-ray fluorescence techniques (XRF), assisted by other micro-spectroscopic and invasive techniques, in their portable and benchtop alternatives, to determine the original composition and pathologies affecting the building materials (mortars/cement and concrete mainly) used to construct the Punta Begoña Galleries (Getxo) in 1918. This construction was abandoned in the fifties and nowadays it is in a very poor conservation state. These Galleries have become an area of study to learn more about the materials and recipes used to prepare the mortars and concretes from the beginning of the 20th century. Moreover, thanks to this work it could be possible to evaluate the stability of the materials and to understand the pathologies (salts, black crusts, stalactites, etc.) suffered due to years of exposure to the marine environment. The influence of anthropogenic activity (road traffic, industry, maritime port, etc.) on their conservation state is also being evaluated. The analytical methodology developed, involved a preliminary in situ analysis of the materials and pathologies using portable instruments (XRF and Raman spectroscopy mainly). In the laboratory a characterization of the samples is being conducted using mainly non-invasive elemental and molecular spectroscopic techniques, but also some destructive techniques. The chemical analyses are also combined with petrographic observations. At present, new methodologies based on the use of XRF techniques are also being developed to determine the concentration of major, minor and some trace elements on solid samples and acid/aqueous extracts coming from the same solid samples of the materials and the pathologies. The acquired knowledge will be extended to develop a quantification methodology for the handheld ED-XRF instrument what could be a promising methodology to observe similarities/differences between all the used materials without extracting any sample from the construction and without tedious sampling pre-treatments.