

Analytical studies to investigate the safeguarding of the original surfaces upon laser cleaning interventions at the Athens Acropolis monuments

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An innovative laser cleaning methodology is being employed since 2002 to restore the unique marble architectural members of the Athens Acropolis monuments. The cleaning challenge refers to the controlled and safe removal of soot deposits and black crust, products of pollution accumulation, which cover extensive parts of the sculpted masterpieces especially in areas protected from direct rain-washing. Traces of unique painted decoration and tool marks are often hidden beneath these pollution encrustations and their preservation upon cleaning interventions is a major issue. Furthermore, it is important to safeguard the fragile and delicate original surface of the stonework including any historic layer, without any chemical (i.e. formation of by-products) or physical (morphological) alteration.

The novel laser cleaning methodology and system that have been developed for this purpose and combine the simultaneous use of two laser beams (IR at 1064nm and UV at 355nm), are by now well described and known. In this paper, the results of the laser cleaning intervention on the Parthenon West Frieze and the coffered ceiling of the Maidens' Porch in Erechtheion, will be presented with emphasis to the safeguarding of the original surface and its details. Systematic analysis of the laser treated surfaces by means of Optical microscopy, X-ray Diffraction (XRD), X-ray Fluorescence (XRF) and Visible - Induced Luminescence imaging (VIL) has confirmed the superiority of the methodology by detecting traces of unaltered/undamaged pigments (Egyptian blue for example), historic protective layers and other details.