

## **Towards the understanding of the two wavelength laser cleaning in avoiding yellowing on stonework**

Athanasia Papanikolaou<sup>1,2\*</sup>, Kristalia Melessanaki<sup>2</sup>, Aggelos Philippidis<sup>2</sup>, Panagiotis Siozos<sup>2</sup>, Kostas Hatzigiannakis<sup>2</sup>, Paraskevi Pouli<sup>2</sup>

<sup>1</sup>*Department of Physics, University of Crete, 700 13 Heraklion, Greece*

<sup>2</sup>*Institute of Electronic Structure and Laser, Foundation for Research and Technology-Hellas (IESL-FORTH), P.O. Box 1385, 711 10 Heraklion, Crete, Greece*

\*[ph3776@edu.physics.uoc.gr](mailto:ph3776@edu.physics.uoc.gr)

The synchronous use of Infrared (IR at 1064nm) and Ultraviolet (UV at 355nm) wavelengths of a Q-Switched Nd:YAG laser has been shown to effectively tackle the issue of yellow discoloration of the treated surfaces, and thus this methodology is effectively employed in various laser cleaning applications.

In order to further investigate the mechanisms that influence this result, a series of tests were undertaken on simulation samples and real marble fragments with environmental encrustation. Through a number of irradiation tests using a variety of laser parameters (individual use of IR and UV beams, as well as, their sequential and synchronous use in various ratios) the different ablative processes have been investigated. Micro-Raman, LIBS and spectral imaging were among the analytical techniques employed in order to divulge the role of each laser beam and their combination and approach the reason behind the yellowing.

The results of the above studies will be presented with the aim to further describe the two wavelength laser cleaning methodology and its principle, thus elucidating its effectiveness.

---