LIF TECHNIQUE FOR NON-INVASIVE REMOTE ANALYSIS OF CH SURFACES: MARBLES, FRESCOES AND RESTORATION MATERIALS

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LIF scanning systems have been applied to analyse different kinds of artworks, like marbles and frescoes, allowing to obtain information on the surface composition and previous restoration actions.
Keywords: LIF scanning, LIF imaging

1. Introduction

Laser systems based on LIF (Laser Induced Fluorescence) can be suitable tools for the analysis of CH surfaces due to their properties of being non-destructive and non-invasive, able to work in situ at several meters of distance from the target, and providing first results in real time. The validity of the LIF technique as diagnostic tool for artworks of different materials, like paintings, wood and stone, has been demonstrated [1,2,3]. Different LIF scanning prototype systems have been developed by ENEA, also trying to take a step towards the availability of techniques user friendly, able to give information, as complete as possible, in rapid time, reducing also the cost of the analysis if possible, in order to optimize the artworks conservation process.
In the frame of the COBRA and ADAMO projects, financed by the Lazio Region, the LIF systems have been applied during some campaigns of measurements in several historical sites to analyse different artworks, like marble pieces and frescoes. Maps of the surface materials, both the original constituents of artworks and the added restoration materials, have been obtained by the acquisition of fluorescence spectra and multispectral images.

2. Experimental

The different available LIF scanning systems developed by ENEA have been described in published papers [4,5,6]. The system to be used for the measurements is selected from time to time depending on the type of artwork to be analysed, shape, size and material, on the environmental context and on the specific requests. The use in combination of systems with different characteristics can be advantageous allowing the optimization of the analysis work. Reduced time of measurement and limited number of sampling points can be obtained for the investigation. Fluorescence emission spectra in the spectral range 270-800 nm and fluorescence images at selected wavelength are resulting by the LIF systems. A data post-processing has been developed and applied to better discriminate different surface materials.

3. Results

In Fig.1, an example of map of surface materials by the LIF image, relative to the statue of ARES Ludovisi at Palazzo Altemps in Rome, is shown. The presence of different marbles has been put in evidence by the data post-processing.

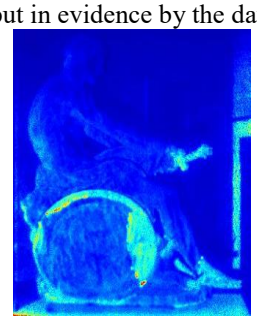

Fig. 1 LIF image at 376 nm of Ares Ludovisi, after the data post-processing.

4. Conclusion

LIF based scanning systems can be useful diagnostic tools in the field of Cultural Heritage. Maps of the surface materials of artworks can be created by means of the resulting multispectral fluorescence images. The availability of maps easy to be read and giving information in rapid time, in synergy with the experience and knowledge of the restorers, can represent an added concrete tool for the optimization of the restoration processes.

References

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