

Laser cleaning of archaeological artefacts using 1064 nm and 532 nm pulsed laser radiation

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Laser cleaning represents the most important contribution of physics and chemistry to the conservation of cultural heritage and has been studied on different types of materials during the past three decades, and has proved to be superior when compared with other methods [1-5]. Contamination removal using high power pulsed lasers is a very advanced, non-contact, precise and a fast technology. Several objects are affected by particulate contaminants of organic or inorganic nature when exposed to either outdoor or indoor environmental conditions. For a successful conservation and restoration process a complete understanding of the artefacts, contaminants and the cleaning mechanism to be employed is prerequisite. In this study pulsed Nd:YAG laser has been used to demonstrate the laser cleaning of corrosion or patina layers on archaeological corroded objects. A part of contamination was deeply penetrated in the samples and was difficult to remove using conventional cleaning methods in comparison to the laser cleaning method owing to the precision and the localized control. Two different wavelengths i.e. Near Infrared (1064 nm) and Visible (532 nm) were used to ablate the contamination layers from the archaeological materials and cleaning status has been demonstrated for comparative dynamics. The chemical composition of the studied artefacts was determined using laser induced breakdown spectroscopy before and after the laser treatment. The cleaning status has been monitored using optical microscopy and scanning electron microscopy.

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