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Subsurface imaging for panel paintings inspection: A comparative study of the ultraviolet, the visible, the infrared and the terahertz spectra

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Abstract:

Infrared (IR) reflectography has been used for many years for the detection of underdrawings on panel paintings. Advances in the fields of IR sensors and optics have impelled the wide spread use of IR reflectography by several recognized Art Museums and specialized laboratories around the World. The transparency or opacity of a painting is the result of a complex combination of the optical properties of the painting pigments and the underdrawing material, as well as the type of illumination source and the sensor characteristics. For this reason, recent researches have been directed towards the study of multispectral approaches that could provide simultaneous and complementary information of an artwork. The present work relies on non−simultaneous multispectral inspection using a set of detectors covering from the ultraviolet to the terahertz spectra. It is observed that underdrawings contrast increases with wavelength up to 1700 nm and, then, gradually decreases. In addition, it is shown that IR thermography, i.e., temperature maps or thermograms, could be used simultaneously as an alternative technique for the detection of underdrawings besides the detection of subsurface defects.