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Preliminary Studies of the Effects of Nanoconsolidants on Mural Paint Layers with a Lack of Cohesion

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Abstract: This paper reports the preliminary results of a comparative analysis of the effects of three consolidants on the color appearance of *fresco* paint layers affected by lack of cohesion. In vitro assays were performed with a laboratory-synthesized nanolime, a commercial nanolime (CaLoSiL® IP25), and a commercial acrylic resin (Primal™ SF-016 ER®) applied by nebulization over two sets of replicas of *buon* and *lime fresco* painted with red and yellow ochres and smalt pigments. The paint layers were surveyed before, one week, and one month after treatment with technical photography in the visible range (Vis) and ultraviolet-induced fluorescence in the visible range (UVF), as well as optical microscopy (OM-Vis), colorimetry, spectrophotometry, and scanning electron microscopy coupled with energy dispersive x-ray spectroscopy (SEM-EDS). Experimental work also comprised the synthesis of nanolime and its characterization by X-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier-transform infrared spectroscopy (FTIR), and thermogravimetry analysis (TGA-DTG). The results show no alteration on pigments' spectral curves and elemental composition. The increase in the CIEL* coordinate and ΔE color variation noticed after the treatment with the nanolimes is associated with a white haze formation on the paint surfaces. The impact on color appearance is higher on the darker tones.

Keywords: consolidants; frescoes; nanolime; acrylic resin; synthesis; colorimetry; OM-Vis; SEM-EDS

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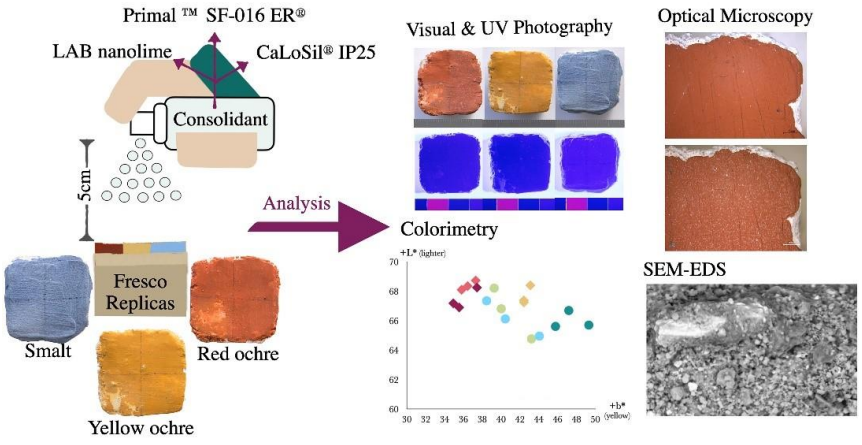

Graphical abstract