The “Scream” by Edvard Munch (1910): non invasive integrated spectroscopic investigations of the painting materials

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This contribution presents the outcomes of the MOLAB campaign carried out in 2017 on the most known artwork of Edvard Munch, *The Scream*, painted in 1910 (date still debated), held at the Munch Museum, through the transnational access granted by the Eu IPERION-CH project. The study was aimed at providing a thorough examination of the painting materials and the support and of their present condition by a total non invasive diagnostic approach. Scanning XRF and hyperspectral VIS-NIR imaging, combined with other complementary non-invasive spectroscopic tools available in the MOLAB platform (UV-Vis-NIR reflectance and fluorescence spectroscopy, reflection FTIR and Raman spectroscopy) allowed the identification and mapping of organic and inorganic painting components (pigments, binder, additives and production residuals) as well as of their possible degradation products (as for example oxalates). Results demonstrated how Munch was open to the introduction of new synthetic pigments such as ZnO, cadmium sulphides (CdS, in the hexagonal and cubic forms) or lead chromates (possibly as $PbCr_{1-x}S_xO_4$) applied in the “Scream (1910)” as dense paint brushstrokes or pastel drawing strokes on the bare cardboard support; traditional materials, such as vermillion (HgS), were also found. Overlaid pure paints as well as pre-mixed pigments were localised on the painting surface as a result of different creative processes. Signs of materials migration, probably due inappropriate storage, were observed possibly following the theft of the painting in 2004 or the habit of the same Munch of leaving his paintings in outdoor environment. The detailed identification and localization of the Zn-, Cd- and Cr- based pigments is crucial for conservation purposes in consideration of the proven sensitivity of these materials to decay processes as a consequence of the type of the industrial formulation they were produced with, the environmental conditions and the interactions with the binder (see for example [1,2] and references therein). Overall, the outcomes of the MOLAB access provided a new body of scientific knowledge of the Munch’s paintings in comparison with previous studies ([3] and literature therein) which will help in furthering the understanding of the Munch’s artistic technique, but most important will provide new hints for addressing targeted preventive conservation strategies of this masterpiece.

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