Painting cracks : a way to investigate the pictorial matter

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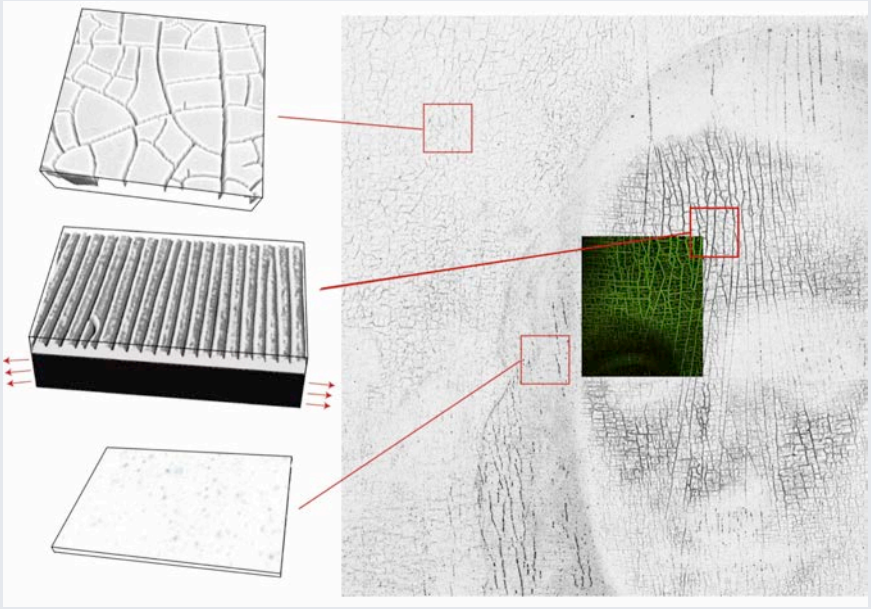
Old paintings generally exhibit a wide variety of crack patterns. From a strictly aesthetic point of view, cracks are undesirable; nevertheless, they can be seen as the fingerprints of the painting and provide valuable knowledge about the art piece. Precisely, the morphology of crack patterns can be related to the mechanical properties of the pictorial matter or they can reveal information about the methods used by the artist or the conditions of conservation. The great variety of crack morphologies encountered in paintings appear to be specifically related to the material and the way the cracks are generated. As evidence, patterns of cracks can be recovered using model systems with tunable mechanical properties.



The modeled system are drying layers of colloidal particles. The use of these model systems, well controlled and characterized, aims to test some theoretical predictions and to deduce qualitative and quantitative values of the mechanical properties of the material.

Figure : crack patterns in some parts of Mona Lisa (multispectral imaging of the pictorial layer in: la Joconde, Essai scientifique, collective work under the direction of C. Lahanier, Codex Images International, 2007). In particular, an array of parallel cracks in a brittle colloidal layer (20 µm thick) on a stretched sublayer (middle sketch), associated with deep cracks in the carnation of Mona Lisa. These measurements on a modeled system was investigated using a biaxial testing apparatus.

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