

Investigations through the coating system: the curious case of the historical bowed string instruments

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The most outstanding violin-makers - among whom Antonio Stradivari is the most celebrated - were active during the 17th and 18th centuries, a period known as the "golden age" of violin-making. Since few documents have been left about methods of the ancient violin makers, most of their know-how have been lost through the centuries. Nowadays, ancient methods and materials are charming secrets to be revealed by scientific techniques.

The present scientific investigation discusses the results obtained by investigating the complex coating systems on bowed string instruments produced by four violin-makers: Jacobus Stainer, Gasparo da Salò, Giovanni Paolo Maggini and Lorenzo Guadagnini. They were selected in order to represent convincingly - albeit not exhaustively - the variety of situations that can be encountered when multi-layered coatings on historical bowed string instruments are considered.

The coating systems have been investigated through micro-invasive and non-invasive procedures [1], employing UV-imaging, portable X-ray fluorescence, optical microscopy, scanning electron microscopy coupled with energy dispersive X-ray spectrometry and Fourier transform infrared microscopy. In addition, two tomographic techniques (synchrotron radiation micro-computed tomography and optical coherence tomography) have been used to image the finishing layers spread on the wood substrate [2,3].

Chemical investigations and images on cross-sections have been compared with the morphological view obtained by tomography, with particular attention to the ability of the tomographic insight to distinguish and measure the various overlying layers, and to highlight the presence of dispersed particles.

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