

Materials Investigations in Art Conservation

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Abstract

Art conservation has been defined as ‘the application of science to the study and treatment of artworks’. Ever since the field of conservation differentiated itself from tradition-bound practices of ‘restoration’, the analytical investigation of materials has been at the heart of virtually every aspect of this field. The decision to intervene by treating an artwork must be based on a materials understanding since, just as in medicine, the fundamental precept of the field is, “First, do no harm”. While great skill is required in treating the decay of artworks, that skill must be guided by an understanding of material properties if incompatibilities and unanticipated long-term damage due to the treatment itself are to be avoided. Analytical investigations of artworks typically employ the spectroscopic tools of analytical chemistry, dating methods based on radioactive decay, structural studies via methods such as metallography and petrography and, in some cases, replication experiments based on ancient technology. Materials science also plays a very large role in the characterization of modern materials to be used in contact with artwork to ensure compatibility and reversibility. Academic and industrial research in materials science most often involves the development and characterization of new materials from relatively pure compounds within tightly controlled environments. By contrast, conservation problems most often entail materials that are complex natural products produced through pre-industrial means that have often been radically altered by the effects of burial or uncontrolled weathering. In some cases, this extends so far as to involve geological pseudomorphism, or fossilization products, making it necessary to employ geochemical study of the alteration products in order to identify the original materials. A group of examples from ancient Chinese metallurgy, forgery of ancient metalwork, European ceramics, and a 20th century theater costume will be presented to illustrate some roles of the materials scientist in this intriguing field.

Bio

John Twilley, a research associate of the Department of Materials Science and Engineering, began research into artists’ materials as an undergraduate at the University of California in 1973. After receiving his B.S. in Chemistry, he spent ten years in the application of instrumental analysis to materials development and failure mechanisms for microelectronics manufacturing and has worked for more than 35 years in art conservation. Twilley was the first to hold the post of Art Conservation Scientist at the J. Paul Getty Museum from 1977-78. Over the years 1979-2000 he taught an introductory course on art and historical artifacts conservation within the history graduate program at the University of California, Riverside, in parallel with his other roles. After a seven year interim during which he served as Manager of the Reliability Analysis Center of Teledyne Microelectronics, Twilley headed the scientific lab of the Los Angeles County Museum of Art from 1985-98. In 1999 he established an independent practice in Art Conservation Science, and now works for a broad spectrum of institutions on problems of artists’ techniques, conservation treatment, and the attribution of artworks. Specific research interests include pigment technology and alteration phenomena, the deterioration and treatment of stone in sculpture and architecture, and ancient metals technology. Twilley is the author of more than 100 publications and technical reports in the area of art conservation.