

Electrochemical methods in archaeometry, conservation and restoration. Antonio Doménech-Carbó, María Teresa Doménech-Carbó, Virginia Costa

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Frank Marken

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Electrochemical principles and methods are key to many areas of measurement and reaction control and, therefore, it comes as no big surprise that electrochemistry can add an important dimension to archaeometry, conservation, and restoration. High profile cases such as the investigation and protection of the clipper Cutty Sark [1] clearly demonstrate the link between electrochemistry and conservation, and it is even more obvious in the field of corrosion prevention. This new monograph provides a well-written insight into a field of practical electrochemistry of fascinating samples.

The complexity of corrosion problems directly relates to the complexity of electrochemical processes involving analysis of art, paintings, historical objects, and other highly heterogeneous samples. The monograph entitled “Electrochemical methods in archaeometry, conservation, and restoration” is therefore dealing with rather complex and fascinating processes, and the authors have managed to maintain some of this complexity without making the text too difficult to approach. Due to the complexity of the electrochemical methods involved in the analysis, this text cannot offer a hands-on guide to the practitioner, but it does give a very helpful overview with many examples and references.

The monograph is structured very systematically with chapter 1 providing insights into measurement philosophy and a wider range of chemical analysis tools. Chapter 2 is dedicated to voltammetry and techniques coupled to voltammetry. Chapters 3 and 4 provide a literature

overview on qualitative and quantitative analysis methods for multi-component samples. Finally, chapters 5 and 6 are dedicated to corrosion and conservation.

Electrochemical processes are extremely sensitive due to the fact that even nanogrammes of material will give substantial current signals. Analytical electrochemistry has evolved a range of highly sensitive tools to explore the potential dependence of processes (speciation) and the associated charge (quantisation). Chapter 2 offers the reader a step-by-step introduction to techniques, first, explaining some fundamental concepts, next, providing many practical examples, and finally, emphasising the need for modern in situ tools such as voltammetry coupled to atomic force microscopy. The topics solid state redox processes, solid state electroanalysis, and electrochemically driven ion insertion mechanisms are featured in this chapter with helpful links to relevant literature.

Chapters 3 and 4 complement the previous parts by providing overviews on multi-component speciation and multivariate analysis methods, as well as quantitative electroanalysis methods. Finally, chapters 5 and 6 link the electroanalysis topic to corrosion and conservation which have enormous practical relevance and which require a good electroanalytical understanding of the sample.

This monograph will provide a valuable resource to art analysts and conservationists with a broad range of information accumulated into a unique single resource. The subject index is carefully compiled to help finding samples and techniques. In particular, the spectrum of practical examples with illustration will be helpful for the novice with a need for an entry point into the electrochemistry literature. The text will hopefully inspire further developments in this field and provide a guide for developers of new electrochemical

F. Marken (✉)
Department of Chemistry, University of Bath,
Bath BA2 7AY, UK
e-mail: F.Marken@bath.ac.uk

techniques in archaeometry and conservation. In conclusion, this book is written in an approachable style to encourage novices in electrochemistry into the field, and it is likely to catalyse new interactions at the interface between art conservation and electrochemistry.

Reference

1. Campbell SA, Gillard SP, Beech IB, Davies W, Monger G, Lawton P (2005) The sv Cutty Sark: electrochemistry in conservation. *Trans Inst Met Finish* 83:19–26