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A review of the use of electrochemical techniques in metal conservation

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A review of the use of electrochemical techniques in metal conservation

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Electrochemical techniques are extensively used by engineers and corrosion scientists to study corrosion mechanisms, corrosion resistance of materials in specific environments and protection systems applied on metal surfaces. Such techniques have also been utilized in the conservation field, particularly to understand corrosion mechanisms affecting historic and archaeological metal artefacts. The study of active corrosion on bronze artefacts and pitting corrosion of aluminium alloys are well known examples.

Since the end of the 19th century, conservation professionals have been using electrochemical techniques to monitor the storage of metal artefacts and to clean, stabilise and protect them. Often however, techniques designed originally to solve a specific conservation problem have been applied as recipes to any kind of material without consideration of side effects. Major damages have resulted in some cases and since then these techniques are classified as “dangerous” by many conservators.

Conservation electrochemists had then to reconsider the use of these techniques in the field and have recently designed some protocols to limit these side effects and achieve better monitoring of artefacts in their environment or/and during their treatment.

This talk will review the progress of knowledge in the use of electrochemical techniques in metal conservation through case studies and the presentation of the most recent research carried out in the field. The current trend is to cluster electrochemical and analytical techniques in parallel in order to fully understand the reactions developed on the metal surface while immersed or polarised in solution. Another field of interest is the development of portable tools for the identification of metal artefacts and corrosion products in order to setup the most appropriate conservation strategy.

More than ever, conservation professionals involved in the use of electrochemical techniques are aware of their potential and have setup teamwork through the ICOM-CC Metal WG and its ETIC (**E**lectrochemical **T**echniques **I**n **C**onservation) sub working group to assure that they are applied in the best conditions for the benefit of Cultural Heritage metal artefacts.

Dr. Christian DEGRIGNY

Christian Degrigny obtained his engineering degree from the National School of Electrochemistry and Electrometallurgy in Grenoble in 1985, and later received a PhD in analytical chemistry from the University of Paris VI (1990). He has conducted research in various conservation laboratories in France and abroad: Valectra group (division of Electricité de France) specialised in the development of electrochemical techniques in conservation, Conservation Annex of the Australian War Memorial, Laboratories ART Métal (F) and Arc'Antique (F) where for the latter he setup a conservation laboratory dedicated to the electrochemical stabilisation of marine metal artefacts. He then moved to Finland to coordinate training programmes at the Conservation Department at EVTEK – Institute of Art and Design, first a master degree on the conservation of marine artefacts and afterwards the whole conservation degree programme as the Director of studies. More recently he was the head of the Diagnostic Science Laboratories at the Malta Centre for Restoration (currently the Conservation Division of Heritage Malta) and contributed greatly to its training branch. Through these different positions he built a strong interest in the transfer of scientific knowledge to conservation professionals and the setup of teamwork between conservation scientists and conservators.

Since 2002 he is the coordinator of the ICOM-CC Metal WG and has been very active in promoting worldwide networking in metal conservation. As a partner in different EU or international projects (COST Actions, INCO-MPC1 PROMET, IAEA regional projects) he has been trying to use the funding possibilities of these projects to create bridges and meeting opportunities (training schools, workshops, seminars) to enlarge the skills and knowledge of conservation professionals.

Currently he is a freelance expert, lecturing in different conservation schools (Oslo, La Chaux de Fond (CH), Amsterdam, Malta) and contributing to different EU projects (PROMET, COST D42). He is as well a member of the working group of Synchrotron SOLEIL / Cultural Heritage. In 2008 he should setup a scientific platform at the conservation school of La Chaux de Fond to better coordinate research and scientific activities within the training of conservation students. Very recently he moved back to France to start with a colleague a cultural and scientific project at Château de Germolles, the only remaining palace of the Dukes of Burgundy (14th c.) in France. One of the objectives of the project is to setup summer schools, workshops dedicated to conservation professionals and (of course) related to a multidisciplinary approach of conservation.

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