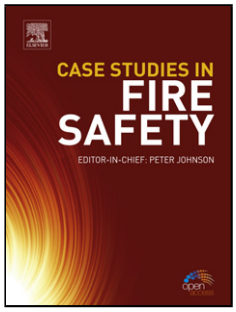

Title: Electrical properties of iron corrosion layers formed in anoxic environments at the nanometer scale

Authors: Florence Mercier-Bion, Jiaying Li, Hélène Lotz, Ludovic Tortech, Delphine Neff, Philippe Dillmann

PII: S0010-938X(17)31254-4
DOI: https://doi.org/10.1016/j.corsci.2018.03.028
Reference: CS 7444

To appear in:

Received date: 11-7-2017
Revised date: 30-1-2018
Accepted date: 16-3-2018

Please cite this article as: Mercier-Bion F, Li J, Lotz H, Tortech L, Neff D, Dillmann P, Electrical properties of iron corrosion layers formed in anoxic environments at the nanometer scale, *Corrosion Science* (2010), https://doi.org/10.1016/j.corsci.2018.03.028

Electrical properties of iron corrosion layers formed in anoxic environments at the nanometer scale

Florence MERCIER-BION*(1), Jiaying LI(1), Hélène LOTZ(1), Ludovic TORTECH(2, 3), Delphine NEFF(1), Philippe DILLMANN(1)

(1) LAPA-IRAMAT, NIMBE, CEA, CNRS, Université Paris-Saclay, CEA Saclay 91191 Gif-sur-Yvette, France
(2) Sorbonne Universités, UPMC Université Paris 06, UMR 8232, Institut Parisien de Chimie Moléculaire (IPCM), 75005 Paris, France
(3) CEA Saclay, IRAMIS, NIMBE (UMR 3685), Laboratoire d'Innovation en Chimie des Surfaces et Nanosciences (LICSEN), 91191 Gif-sur-Yvette, France

*Corresponding author's e-mail address: florence.mercier@cea.fr (F. Mercier-Bion).

Highlights

- Determination at the nanometer scale by Conductive-Atomic Force Microscopy (C-AFM) of the electrical properties of the corrosion layers of iron in archaeological artefacts;
- Magnetite and iron sulfides, although embedded in the insulating ferrous carbonates matrix and located at hundred microns from iron metal, present a conductive character. This result suggest that a delocalization of the corrosion cathodic reaction where the electrons from iron metal would transit through a tridimensional network of connected magnetite strips passing through the ferrous carbonate matrix.