



Direct impact and delayed post-discharge chemical reactions of Fe^{II} complexes induced by non-thermal plasma

Samuel Laminsi^a, Elie Acayanka^a, Serge Nzali^a, Peter Teke Ndifon^a, Jean-Louis Brisset^{b,*}

^aInorganic Chemistry Department, University of Yaounde-I, P.O. Box 812, Yaounde, Cameroon

^bLaboratoire d'Electrochimie (L.E.I.C.A.), UFR des Sciences de l'Université de Rouen, 76821 Mont-St. Aignan, France
Email: brissjl@club-internet.fr

Received 12 March 2010; Accepted 30 June 2011

ABSTRACT

Dilute solutions of organometallic complexes, i.e., Ferrocene and *tris*(1,10-phenanthroline)Fe^{II} or ferroïn, readily oxidize when exposed to the gaseous species generated in a gliding electric discharge in humid air. Ferrocene (or *bis*-cyclopentadienyl Fe^{II}) turns to blue ferricinium ion while ferroïn solutions fade. Ferroïn is gradually oxidized to ferriïn which agrees with the higher sensitivity of the central metal to the action of plasma than the organic ligand engaged in the complex. The oxidation hardly obeys a pseudo 1st order kinetics law ($k_1^* = 4 \times 10^{-2} \text{ min}^{-1}$). Additionally the oxidation reaction keeps on developing in post-discharge conditions according to a pseudo 1st order reaction ($k_1 = 5 \times 10^{-3} \text{ min}^{-1}$). This feature tends to generalize the occurrence of temporal post-discharge reactions which are of major interest for industrial applications.

Keywords: Gliding discharge; Non-thermal plasma; *tris*(1,10-phenanthroline)₃Fe^{II}; Ferrocene; Post-discharge; Humid air; Oxidation

*Corresponding author.