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An Electrochemical Investigation of the Electrodeposition of Non-Intact Tri-Nuclear Clusters on Platinum Working Electrodes

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Abstract

The goal of this research was to study the electrochemical behavior of tri-nuclear clusters of molybdenum and tungsten - first in the ionic liquid EMIBF₄, and then in the polar-aprotic solvent DMSO. Four tri-nuclear cluster compounds were studied: Hexa-μ₂-acetatotriaquadi-μ₃-oxotrimolybdenum (IV, IV, IV) trifluoromethanesulfonate [Mo₃ O₂ (O₂ CCH₃)₆ (H₂ O)₃](CF₃ SO₃)₂, Hexa-μ₂-acetatotriaquadi-μ₃-oxodimolybdenum (IV, IV) tungsten (IV) trifluoromethanesulfonate [Mo₂ WO₂ (O₂ CCH₃)₆ (H₂ O)₃](CF₃ SO₃)₂, Hexa-μ₂-acetatotriaquadi-μ₃-oxomolybdenum (IV) ditungsten (IV, IV) trifluoromethanesulfonate [MoW₂ O₂ (O₂ CCH₃)₆ (H₂ O)₃](CF₃ SO₃)₂, and Hexa-μ₂-acetatotriaquadi-μ₃-oxotritungsten (IV, IV, IV) trifluoromethanesulfonate [W₃ O₂ (O₂ CCH₃)₆ (H₂ O)₃](CF₃ SO₃)₂. All information gathered from CV data on tri-nuclear clusters will be discussed. The study of the electrodeposition efforts with molybdenum- and tungsten-based tri-nuclear clusters onto Pt electrodes in EMIBF₄, and DMSO, will be compared to past investigations by Katovic et al.. In addition, the electrochemical properties of these four trinuclear clusters in the DMSO-based solvent system were explored and are novel findings.

Key words: Tri-nuclear clusters, electrodeposition, Cyclic Voltammetry

1. Introduction

The history of tri-nuclear clusters began with the discovery of homonuclear metal-metal

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