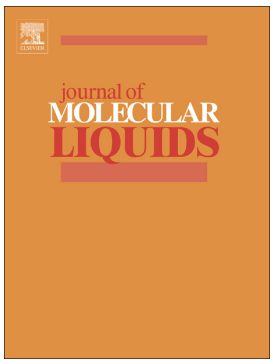

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I.B. Obot, Ikenna B. Onyeachu

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Electrochemical frequency modulation (EFM) technique: Theory and recent practical applications in corrosion research

I.B.Obot[a,*] and Ikenna B. Onyeachu[b]

[a]Center of Research Excellence in Corrosion, Research Institute, King Fahd University of Petroleum and Minerals, Dhahran, 31261 Saudi Arabia
[b]Department of Chemistry, Edo University, Iyamho, Edo State, Nigeria

Abstract

Determining instantaneous corrosion rate and corrosion mechanism of metals, whilst ensuring the most minimal damage of the sample, is an important ingredient for an electrochemical technique**.** In recent times, electrochemical frequency modulation (EFM) has attracted the attention of corrosion researchers as a promising technique with high sensitivity due to the measurement of corrosion parameters at harmonics and intermodulations of input frequencies, as well as high accuracy due to the inherent calculation of causality factors. Comparison of data obtained from EFM with results from conventional electrochemical techniques for corrosion analysis has, therefore, become a common trend. In the following paper, we review the EFM technique and its propensity to become an electrochemical technique of choice for corrosion research. The fundamental principles, modes of data collection as well as a critical comparison between EFM technique and contemporary electrochemical techniques are detailed. Recent application of EFM for the evaluation of corrosion inhibitors, analyses of CO_2 corrosion and the evaluation of microbially–induced corrosion are highlighted.

Keywords: Electrochemical Frequency Modulation (EFM); Corrosion Inhibition; Electrochemistry; CO_2 corrosion; Microbiologically Influenced Corrosion (MIC).

*Corresponding author

I.B. Obot (Email: obot@kfupm.edu.sa)