Study on the Initial Atmospheric Corrosion Behavior of Copper in Chloride-Containing Environments

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The initial atmospheric corrosion process of copper (in 1 hour) was investigated by quartz crystal microbalance (QCM), SEM, XRD and AFM techniques. As a kind of electrochemical noise, the QCM data had been analyzed by Fast wavelet transform technique (FFT). The results showed that, both the $Q\sim t$ curves deduced from QCM data and XRD patterns confirmed the initial atmospheric corrosion products of copper is Cu$_2$O, and which corrosion severity increased with both the concentration of NaCl and corrosion time. A new parameter named electrochemical active energy ($E_c$) was proposed from the FFT analysis of QCM data, which is not only in direct proportion to the corrosion severity (such as weight loss), but can also be used to deduce the corrosion mechanism appropriately.

Keywords: Copper; Electrochemical noise; Fast wavelet transform technique; Atmospheric corrosion

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