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between copper and AA2024 alloy**

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Surface-resolved electrochemical study of the galvanic effects between Copper and AA2024 alloy

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In recent years Local Electrochemical Impedance Measurement (LEIM) has been established as a powerful tool for elucidation of local interfacial processes. In this technique, the local ac current density is obtained from potential difference measurements near the electrode surface using a dual micro-electrode probe. The use of the microprobe allows determination of the impedance spectrum at different points of an active electrode but also mapping of an active surface at a fixed frequency¹. When mapping is involved, results are usually presented as admittance.

In our study a galvanic couple constituted of copper and aluminium AA2024 alloy, as well as the isolated electrodes, was used to study the capabilities of the technique. A *Uniscan* system has been used, with a modified probe². The time of exposure, the effect of coupling and the effect of polarization were studied, with emphasis on the choice of frequencies for admittance mapping.

At high frequencies the results are dominated by the electrolyte resistance and thus the admittance was nearly constant, irrespective of time and of polarization, whereas at low frequencies a capacitive response and a good sensitivity to the changes of activity were observed.

Fluctuations of the admittance over the aluminium at a fixed frequency revealed the nucleation of metastable pits and was observed as a result of either coupling to copper or of a small anodic polarization. This approach revealed benefits when compared to the spectrum measurement.

The advantages and limitations of the technique are discussed based upon the results.

1. Lillard, R.S., J. Electrochem. Soc., vol. 139, pp. 1007-1012, 1992

2. Jorcin J., Blanc C., Pébère N., Tribollet B., J. Electrochem. Soc., 155, pp. C46-C51, 2008.