Electrochemical Reactivity at Heterogeneous Alloy Surfaces: Wall-Jet Flow Cell and SECM Studies

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Several aluminum alloys contain intermetallic compounds that influence their corrosion behavior. In particular, AA 2024-T3 alloys have intermetallic inclusions that variously contain Al, Cu, Fe, Mn or Mg [1]. These cause corrosion of AA 2024 by virtue of galvanic cells that arise because of compositional variations across the surface [2]. One particular type of inclusion, Al_2CuMg (the S phase), has been suggested to be a source of Cu-rich regions that can act as cathodes in local galvanic cells [1]. This type of behavior is thought to drive the severe susceptibility of these alloys toward corrosion. Thus, there is significant motivation to understand the behavior of these inclusions, especially with regard to their electrochemical reactivity. This presentation describes the results of two separate studies of the electrochemical reactivity of this alloy using either a wall-jet flow cell to study dioxygen reduction at the alloy surface under potentiostatic conditions or a scanning electrochemical microscope to examine the heterogeneous nature of the electrochemical reactivity of this alloy.

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REFERENCES

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