

Study of the effect of temperature and concentration on the corrosion behavior of B₄C/6061Al neutron absorbing composite in H₃BO₃ solutions

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Abstract The corrosion behavior of B₄C/6061Al in deionized water and different H₃BO₃ concentrations (500, 2500, 5000 and 10000 ppm) and temperatures (20 °C, 50 °C and 90 °C) was investigated by combining experimental and modelling studies. In deionized water B₄C/6061Al forms γ-AlOOH and Al(OH)₃. Increasing temperature will promote γ-AlOOH formation whereas an increase in H₃BO₃ concentration will dissolve corrosion products. The corrosion resistance decreases from 20 °C to 50 °C but increases at 90 °C, peaking at 2500 ppm H₃BO₃ for all temperatures. B₄C particles in the aluminum matrix cause micro-galvanic effects, increasing the corrosion rate.

Keywords B₄C/6061Al; deionized water; H₃BO₃ solution; corrosion product; micro-galvanic corrosion; FEM simulation

Reference

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