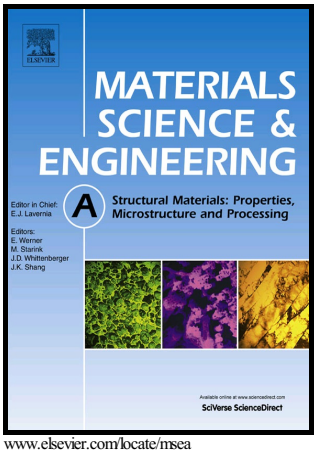

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Combined microtomography, thermal desorption spectroscopy, X-ray diffraction study of hydrogen trapping behavior in 7XXX aluminum alloys

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Abstract

In the present study, combined thermal desorption spectroscopy (TDS), microtomography and X-ray diffraction study has been carried out to identify the hydrogen trap sites in 7XXX aluminum alloys. Through constant heating rate TDS experiments, three distinct trap states have been identified. It is revealed that micropores are the predominant hydrogen trap site in alloys with medium hydrogen content, whereas grain boundaries is the major hydrogen trap site in alloys with low and high hydrogen content. We have clarified that the rate of trap site occupancy in grain boundaries is high compared to dislocations and vacancies. Such high hydrogen coverage at grain boundaries indicates that the hydrogen-assisted fracture would be intergranular.

Keywords: Thermal desorption spectroscopy, Microtomography, XRD, Hydrogen trapping, Hydrogen embrittlement, Aluminum alloys

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