

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Environmental Effects and Spacecraft Protection (6)

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MECHANICAL TESTING OF HYDROGEN CHARGED TI-6AL-4V ALLOY

Abstract

Sheet material Ti-6Al-4V was water jet cut into tensile and CT specimens. The Young's Modulus of the material was found to be 106.5 GPa with an average elongation of 7.45%. CT specimens were electrochemically hydrogen charged to different levels, uncharged specimens were found to contain 60 ppm hydrogen while, CT005 and CT044 had approximately 150 ppm and CT046 approximately 380 ppm. CT specimens were tested at slow strain rates of 1×10^{-8} mm/s via constant crosshead displacement. A series of microscopy and SEM tests were carried out on fractured specimens. Microscopy showed no evidence of hydrides in the samples; however SEM images showed a distinct change in failure mode between charged and uncharged samples, with uncharged samples exhibiting ductile fracture and charged specimen CT046 exhibiting mixed mode fracture indicative that embrittlement of the specimen had occurred. A defect was also found on both microscopy and SEM images further analysis using spectroscopy found the defect to be boron fibre.