

Hydrogen Mapping using Atom Probe Tomography

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A critical component missing from our understanding of hydrogen embrittlement is knowledge of the hydrogen concentration at specific locations such as around dislocations, grain boundaries, precipitates, and second phase particles in the metal. Current techniques (such as tritium radiography, thermal desorption spectroscopy, secondary ion mass spectrometry, microprint lithography and so on) have insufficient spatial resolution for observing concentrations at the nanometer scale. Although existing attempts to use atom probe tomography for mapping hydrogen have reported to be unsuccessful or inconclusive, with perhaps the exception of the recent work of Takahashi, atom probe tomography has promising potential to detect the hydrogen concentrations with atomic resolution and is worth pursuing as a future technique.