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# Hydrogen Distribution at Twin boundary in Austenitic Stainless Steel Studied by Scanning Kelvin Probe Force Microscopy

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## ABSTRACT

Twin boundary (TB) separation is usually observed on the fracture surface of austenitic stainless steels ( $\gamma$ -SS) under the influence of hydrogen. However, previous studies fell short in determining the hydrogen distribution and diffusion behavior at the TB. Scanning Kelvin probe force microscopy (SKPFM) is used to investigate the hydrogen distribution at TB in thermally hydrogen-precharged  $\gamma$ -SS. It is found that there are many martensite ( $\alpha'$ ) at TBs in the material. TBs with  $\alpha'$  provide fast paths for hydrogen diffusion and some hydrogen is trapped at these areas, which is proposed to be one of the reasons for the TB separation. In contrast, no clear acceleration of hydrogen diffusion and trapping of hydrogen are found at TBs without  $\alpha'$ .

**Keywords:** Hydrogen; Atomic force microscopy; Metals and alloys; Twin boundary

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