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## Quantitative estimation the controlling factor in the stress corrosion cracking of high-strength aluminum alloys

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**Abstract** Stress corrosion cracking (SCC) of high strength aluminum alloys is controlled by many factors, including the anodic dissolution, the corrosion-induced hydrogen, and the stress related processes. In the present work, a quantitative estimation of these factors in triggering the SCC of 2024-T351, 7075-T651, and 7050-T6 aluminum alloys in solution and thin electrolyte layer (TEL) in the presence of Cl<sup>-</sup> and HSO<sub>3</sub><sup>-</sup> is conducted. It is found that synergistic effect of stress, corrosion, and hydrogen during in-situ tensile test dominates the degradation of aluminum alloys in solution environment, while the corrosion-induced hydrogen during exposure without load controls the SCC of aluminum alloys in TEL environment in the presence of Cl<sup>-</sup>. The former contributes to 96% of total elongation loss of 7075-T651 and the latter accounts for 78% of the ductility degradation of 2024-T351. In the presence of HSO<sub>3</sub><sup>-</sup>, the contribution of hydrogen-induced degradation further increases and the irreversible damage caused by corrosion shows little effect of the ductility of the 7050-T6 high-strength aluminum alloy.