# Mechanical Properties and Hydrogen Embrittlement of Lean Duplex Stainless Steel 2101 with Microstructure under Different Aging Times

Bo Zhang, **Wenrui Tu**, Jin Li, Yiming Jiang, Yangting Sun*

*Department of Materials Science, Fudan University, Shanghai 200438, China*

24110300094@m.fudan.edu.cn

**Abstract** The mechanical properties and hydrogen embrittlement of lean duplex stainless steel 2101 (LDX 2101) with various microstructures under different aging times remain poorly understood. In this study, LDX 2101 was aged at 750°C, and it was found that tensile strength increased with aging time, while elongation and hydrogen embrittlement susceptibility initially increased and then decreased. Multiple characterization techniques, especially electron backscatter diffraction (EBSD), are employed to explore the microstructure evolution and the corresponding mechanism. The results indicated that at shorter aging times, the austenite phase was more susceptible to transformation-induced plasticity (TRIP) effect, which enhanced elongation but also increased hydrogen embrittlement susceptibility. Prolonged aging times led to the formation of $Cr_2N$, which accelerated martensitic transformation and consequently reduced elongation. Furthermore, the presence of secondary austenite slowed the propagation of hydrogen-induced cracking (HIC), thereby decreasing hydrogen embrittlement susceptibility.

**Keywords** Lean duplex stainless steel 2101, Precipitate, Mechanical properties, Hydrogen embrittlement, TRIP (transformation-induced plasticity)

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