HYDROGEN EFFECTS ON NANOMECHANICAL BEHAVIOR OF ADDITIVELY MANUFACTURED 316L STAINLESS STEELS

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Additive manufacturing (AM) has received considerable attention in recent years due to its ability to produce complex engineering components with reduced cost and waste, which simply cannot be made with conventional manufacturing processes. It has been reported that AM 316L austenitic stainless steel (SS) has excellent mechanical properties and possibly even breaks the strength-ductility trade-off. For practical industrial application, it is necessary to investigate the AM steel's resistance to hydrogen embrittlement which is unavoidable in most strucral applications. In this work, we explore the hydrogen effects on nanomechanical responses of AM 316L SS (such as hardness, strain rate sensitivity, activation volume). The obtained results will be compared with those of conventional 316L SS and discussed in terms of hydrogen effect on plastic deformation and microstructure.

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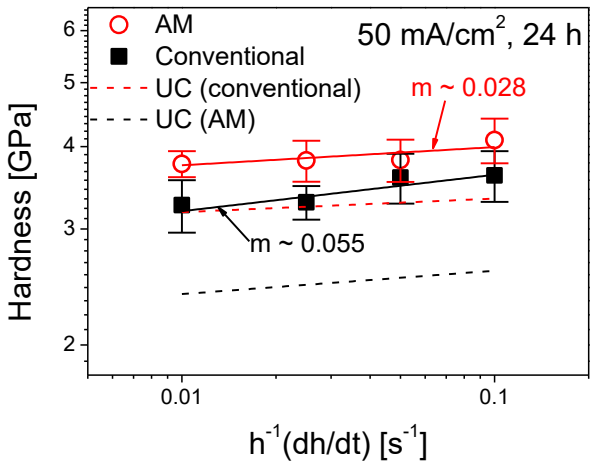

Figure 1 –Strain rate sensitivity of E-charged 316L SS