

Effect of aging temperature on the microstructure, local-mechanical properties and wear behavior of a UNS S32750 super-duplex stainless steel

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Abstract: In this paper, the effect of aging temperature on the microstructure, local-mechanical properties and wear behavior of a UNS S32750 super-duplex stainless steel is investigated. A massive preferential precipitation of γ phase and Cr₂N is detected at the periphery of ferrite with an increase in their extent as aging temperature increases. Simultaneously, the γ phase decomposition is accentuated with temperature and reaches its maximum at 850°C. This behavior results in an enhancement in hardness and Young's modulus accompanied by a higher plasticity ratio. The wear resistance of the aged samples is investigated in terms of friction coefficients and wear rates against two counterparts. The wear performance follows γ phase presence, the higher γ phase extent, the higher the wear resistance. It is found that the change in wear mechanisms in the 850°C aged samples from abrasive against AISI-304L counterpart to adhesive-oxidative against Al₂O₃ counterpart is responsible in the increase in wear resistance.

Keywords : 2507 SDSS, Aging temperature, microstructure, precipitates, Nano-indentation, Wear resistance.