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Effect of annealing temperature on transformation induced plasticity effect of a lean duplex stainless steel

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Abstract: Effects of annealing temperature on the mechanical property and martensite transformation of a new lean duplex stainless steel have been investigated. It was found that the elongation increased with the annealing temperatures and reached the maximum of 61.2% after annealing at 1150°C. A sequential $\gamma \rightarrow \varepsilon \rightarrow \alpha'$ martensite transformation was generated during tensile and brought the transformation induced plasticity effect. More than 30% α' martensite was induced after tensile in the specimens annealed at 800~1000°C, whereas only 8.8% α' was induced at 1150°C. The $M_{d(30/50)}$ temperatures of austenite phase reduced from 97°C to 46°C with the annealing temperatures varying from 800°C to 1150°C. Therefore the austenite phase became more stable and transformed to ε and α' martensite phase gradually in a wide region and thus caused better plasticity. This also indicated that $\gamma \rightarrow \varepsilon$ transformation was important for transformation induced plasticity effect.

Keywords: lean duplex stainless steel; transformation induced plasticity; martensite transformation; annealing temperature;

1. Introduction

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