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Anti-aging treatment of nuclear power plant steel

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Abstract

Duplex stainless steel loses impact toughness quickly during its service at nuclear power plant station as pipe and boiler. Aging induced spinodal decomposition in ferrite phase is the mechanism behind this degradation. This work uses electropulsing to treat the aged steel at the service temperature. The Charpy impact toughness and Vickers micro-hardness were recovered significantly. Thermoelectric power is recommended to measure the degree of spinodal decomposition in the aging processing, which was recovered by >83% by the electropulsing treatment. It was proved that the anti-aging treatment has nothing to do with the Ohm heating. Instead, the electropulsing-induced extra free energy change of -891 J/mol provided thermodynamic driving force for the

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