Determination of the concentration dependent diffusion coefficient of nitrogen in expanded austenite - DTU Orbit (18/11/2019)

The concentration dependent diffusion coefficient of nitrogen in expanded austenite was determined from the rate of retracting nitrogen from thin initially N-saturated coupons. Nitrogen saturated homogeneous foils of expanded austenite were obtained by nitriding AISI 304 and AISI 316 in pure ammonia at 693 K and 718 K. Denitriding experiments were performed by equilibrating the foils with a successively lower nitrogen activity, as imposed by a gas mixture of ammonia and hydrogen. The concentration dependent diffusion coefficient of nitrogen in expanded austenite was approximated in the composition range where nitrogen can be extracted by hydrogen gas at the diffusion temperature. Numerical simulation of the denitriding experiments shows that the thus determined concentration dependent diffusion coefficients are an accurate approximation of the actual diffusivity of nitrogen in expanded austenite.

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