

Composition-dependent variation of magnetic properties and interstitial ordering in homogeneous expanded austenite - DTU Orbit (08/11/2017)

Composition-dependent variation of magnetic properties and interstitial ordering in homogeneous expanded austenite

The crystal structure and magnetic properties of austenitic stainless steel with a colossal interstitial content, so-called expanded austenite, are currently not completely understood. In the present work, the magnetic properties of *homogeneous* samples of expanded austenite, as prepared by lower-temperature nitriding of thin foils, were investigated with magnetometry and Mössbauer spectroscopy. At room temperature, expanded austenite is paramagnetic for relatively low and for relatively high nitrogen contents ($y_N = 0.13$ and 0.55 , respectively, where y_N is the interstitial nitrogen occupancy), while ferromagnetism is observed for intermediate nitrogen loads. Spontaneous volume magnetostriction was observed in the ferromagnetic state and the Curie temperature was found to depend strongly on the nitrogen content. For the first time, X-ray diffraction evidence for the occurrence of long-range interstitial order of nitrogen atoms in expanded austenite was observed for high nitrogen contents.

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Authors: Brink, B. K. (Intern), Ståhl, K. (Intern), Christiansen, T. L. (Intern), Frandsen, C. (Intern), Hansen, M. F. (Intern), Somers, M. A. J. (Intern)

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