In-situ analysis of redistribution of carbon and nitrogen during tempering of low interstitial martensitic stainless steel

The redistribution of C and N during tempering of X4CrNiMo16-5-1 martensitic stainless steel containing 0.034 wt% C and 0.032 wt% N was studied using in-situ synchrotron X-ray diffraction (XRD) and atom probe tomography (APT). The unit cell volume of martensite decreased continuously during tempering. APT showed that this volume decrease is accounted entirely for by segregation of the interstitial atoms, implying that in low interstitial martensitic stainless steel stress relaxation only contributes negligibly to changes in the martensite unit cell volume.

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Corresponding author: Niessen, F.
Contributors: Niessen, F., Villa, M., Danoix, F., Hald, J., Somers, M. A.
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