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ABSTRACT BOOK

interstitial sites of α-Fe, which reduce the strain energy required during bainite transformation. In the end, a consistent prediction of bainite start temperatures is achieved.

550 Iron-iron oxide core-shell nanochains and their possible environmental applications

Marcin Krajewski, Paulina Pietrzyk, Magdalena Osial, Sz-Chian Liou, Andrzej Świątkowski, Katarzyna Pawluk
Institute of Fundamental Technological Research Polish Academy of Sciences, Warsaw, Poland

Recently, a relatively new concept i.e. magnetic-field-induced (MFI) synthesis, which allows manufacturing the one-dimensional (1D) wire-like nanochains composed of nanoparticles, has been developed. This method is based on a combination of various chemical processes such as hydrothermal reactions, thermal decomposition processes, reduction reactions, etc. and simultaneous usage of an external magnetic field. In fact, the magnetic field in the MFI synthesis acts as a parameter which allows controlling the nanochains growth in one well-defined direction.

It has been recently demonstrated that the MFI synthesis can be applied to produce the iron-iron oxide core-shell nanochains. This nanomaterial reveals a complex structure in which the metallic cores are covered by a very thin oxide shells. Hence, several complementary experimental techniques including scanning electron microscopy (SEM), high resolution transmission electron microscopy (HRTEM), electron diffraction (ED), electron energy loss spectroscopy (EELS), X-ray diffraction (XRD), and X-ray photoemission spectroscopy (XPS) have been applied in order to determine the most likely structure and chemical composition of iron-iron oxide nanochains. Moreover, this work presents the preliminary results on their possible application in a detection of heavy metal ions in water as well as adsorption of dyes from water.

551 Comparison of high-temperature tribological properties in different high-entropy sublattice ceramic coatings

Andreas Kretschmer, Harald Rojacz, Ewald Badisch, Peter Polcik, Paul Heinz Mayrhofer
Institute of Materials Science and Technology, TU Wien, Vienna, Austria

High-entropy sublattice ceramics are promising candidates for application as wear resistant thin films. Therefore, the tribological performance of three different sputtered high-entropy sublattice ceramic coatings, (Al,Cr,Nb,Ta,Ti)O_2, (Al,Cr,Nb,Ta,Ti)N, and (Hf,Ta,V,W,Zr)B_2, with excellent reported thermal stability up to 1200 °C, was analyzed and compared against TiN in dry pin-on-disk tests in ambient air at room temperature (RT), 400 °C and 700 °C, and in high-temperature (HT) scratch tests. In the dry pin-on-disk tests, all coatings show similar coefficients of friction (CoF) around 0.8-1.0 at RT. At elevated temperatures, the CoF of both nitrides decreases to ~0.4. The oxide coating suffers from poor adhesion, resulting in quick delamination during all tests. The boride coating increases its CoF at elevated temperatures to ~1.2 after a long run-in phase, signifying the formation of non-lubrication oxides, as