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Factors influencing achievement of chemical order in tetragonal FeNi NINA BORDEAUX, ANA MARIA MONTES-ARANGO, Northeastern University, JIAXING LIU, KATAYUN BARMAK, Columbia University, LAURA HENDERSON LEWIS, Northeastern University — Chemically ordered ferromagnetic compounds with the $L1_0$ structure have attracted wide interest for rare-earth-free permanent magnet applications. In particular, $L1_0$-structured FeNi is a promising candidate due to the abundance and low cost of the constituent elements and high theoretical maximum energy product (BH)max = 42 MGOe [1]. Synthesis of $L1_0$ FeNi has been hindered by extremely sluggish kinetics below the equilibrium order-disorder temperature $T_{O/D} = 320\ ^\circ$ and the phase is known to form in meteorites over millions of years. In this work, the thermodynamic stability of the $L1_0$ phase and kinetics of the $L1_0 \rightarrow$fcc magnetostructural phase transformation are quantitatively determined via magnetic and thermal measurements of bulk $L1_0$ FeNi extracted from meteorites. Influences on phase transformation kinetics, including effects of magnetism, will be discussed.

[1] L. H. Lewis, et al., IEEE Mag Lett 5 (2014) 5500104.

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