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Kambersky Damping in L10 Magnetic Materials of Ordered and Disordered States with Substitutional Defects¹ TAO QU, RANDALL VICTORA, University of Minnesota-Minneapolis — L1₀ phase alloys with high magnetic anisotropy play a key role in spintronic devices. The damping constant α represents the elimination of the magnetic energy and affects the efficiency of devices. However, the intrinsic Kambersky damping reported experimentally differs among investigators and the effect of defects on α is never investigated. Here, we apply Kambersky's torque correlation technique, within the tight-binding method, to L10 ordered and disordered alloys FePt, FePd, CoPt and CoPd. In the ordered phase, CoPt has the largest damping of 0.067 while FePd has the minimum value of 0.009 at room temperature. The calculated damping value of FePt and FePd agrees well with experiment. Artificially shifting E_f , as might be accomplished by doping with impurity atoms, shows that α follows the density of states (DOS) at E_f in these four L10 alloys. We introduce lattice defects through exchanging the positions of 3d and non-3d transition elements in 36 atom supercells. The damping increases with reduced degree of chemical order, owing to the enhanced spin-flip channel allowed by the broken symmetry. This prediction is confirmed by measurements in FePt. It is demonstrated that this corresponds to an enhanced DOS at the Fermi level, owing to the rounding of the DOS with loss of long-range order.

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