Periods of Long Period Superlattices in Alloys

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Abstract

Domain sizes of long period superlattices in alloys are calculated by minimizing the ordering energy which mainly originates from the energy of conduction electrons. The domain size M thus obtained has a strong tendency to be fixed at integral numbers. This tendency explains the experimental results that the periods are fixed at $M=2$ in A_3B-type alloys, such as Au-Cd, Au-Zn, and Pd-Mn, independently of their electron-atom ratios. The anomalous dependence of M on the electron-atom ratio in the Ag-Mg alloy system is also explained.

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