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Ultrasonic properties of $Mg_{23}Al_3Y_4$ alloy with LPSO structures

Mikio Fukuhara [*,1], Mitsuhiro Takeda[2], and Kazuya Konno[2]

[1] New Industry Creation Hatchery Center, Tohoku University, Sendai 980-8579, Japan
[2] Department of General Engineering, National Institute of Technology, Sendai College, Natori 981-1239, Japan

Corresponding author at: Tohoku University, Sendai 980-8579, Japan. Tel: +81-22-352-6601; fax: +81-22-352-6601. *E-mail: fukuhara@niche.tohoku.ac.jp*

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ABSTRACT

Ultrasonic properties of $Mg_{23}Al_3Y_4$ alloy, which has a synchronized long-period stacking ordered (LPSO) structure, were examined in terms of valence electron concentration (*VEC*), and real and complex elasticities. The alloy locates to a point (2.54, 436.5 K) near a critical amorphous alloy composition, and a point with largest Poisson's ratio (0.322) and lower *G/K* (0.404) in metal group, showing a metastable like metallic alloy. The addition of small amounts of Al and Y elements, *i.e.* appearance of excess electrons induces an increase in c/a ratio and cell expansion of hcp Mg lattice, and stabilization of cluster structures, leading to formation of LPSO phases with $L1_2$ typed Al_6Y_8 clusters. The elasticity and viscoelasticity of the alloy is predominated by