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**$\{10\bar{1}\}$ twin boundary showing very large deviation from the
theoretical one in deformed magnesium alloy**

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Abstract

Structure of $\{10\bar{1}\}$ twin boundary in an AZ31 magnesium alloy has been characterized by means of transmission electron microscopy (TEM) and high-resolution TEM. It is found that actual twin boundary entirely departs from theoretical twinning plane in $\{10\bar{1}\}$ twin system. Furthermore, it is shown that six kinds of facets, including $\{10\bar{1}\}$ coherent twin boundaries, $\{0002\} \parallel \{10\bar{1}\}$ basal-pyramidal (BPy), $\{10\bar{1}\} \parallel \{0002\}$ pyramidal-basal (PyB), $\{1010\} \parallel \{10\bar{1}\}$ prismatic-third pyramidal (P3Py), basal-prismatic (BP/PB) boundaries and $\{10\bar{1}\}$ coherent twin boundaries, can coexist in one $\{10\bar{1}\}$ twin system. Based on these structure features, the underling mechanisms responsible for large deviation phenomenon are discussed, with focus on BPy, PyB, P3Py boundaries and strain accommodation.

Key words: Magnesium alloy; Twinning; Twin boundary; HRTEM

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