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Nanocrystalline Ti/AZ61 magnesium matrix composite: evolution of microstructure and mechanical property during annealing treatment

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Abstract

Nanocrystalline Ti/AZ61 magnesium matrix composite, prepared by mechanical milling, was annealed in the temperature range of 573-723 K for various durations. During annealing treatment, diffusion of Al and Ti elements, formation of precipitates and grain growth behavior were observed and the evolution of hardness was obtained. Based on microstructural evolution, the mechanism for the precipitating of Ti and Al from magnesium matrix was analyzed. And the corresponding schematic illustration of microstructural evolution model was proposed. By the observation from high-resolution transmission electron microscopy, it was found that dispersing nanometer sized particulates, precipitated from Ti and Al supersaturated Mg solid solution, pined up magnesium grain boundaries. During annealing treatment, the nano-scaled precipitates together with original submicron Ti particulates hindered the

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