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Microstructure and mechanical properties of Mg-4.0Zn alloy reinforced by NiO-coated CNTs

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Mg-4.0Zn alloy composite reinforced by NiO-coated CNTs (NiO@CNTs) was synthesized by combining ball-milling and a casting process. The yield strength (YS) and elongation to failure of the composite were dramatically increased by 44.9% and 38.6%, respectively, compared to its alloy counterpart. The significantly enhanced mechanical properties of the as-synthesized composite are mainly ascribed to an improved interfacial bond, grain refinement and good dispersion of CNTs in the matrix via coating NiO on CNTs. It is shown that the NiO-nanolayer on the CNTs significantly enhances the interfacial bonding strength and effectively prevents the agglomeration of CNTs. NiO@CNTs are, therefore, expected to be a highly sustainable and dispersible reinforcement for magnesium matrix composites with superior performance.

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