Nanocomposites and Nanomaterials

Lightweight metal matrix nanocomposites: electrical conductivity and microstructure of the Mg-based alloys with bimetallic CoPd nanoadditions

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Metal matrix nanocomposites (MMNCs) are multiphase solid materials in which at least one of the presented phases has leastwise one dimension in the nanoscale range; while nanoparticles should reinforce the structure of the corresponding metal matrix and improve the properties. These materials offer new technological opportunities and are prospective candidates for various sectors of industry.

During the past decade the development of lightweight metal matrix nanocomposites was mostly based on Al and Mg. In case of Mg-based MMNCs, SiC nanoparticles (NPs) and carbon nanotubes are used as nanosized reinforcements.

The electrical conductivity of Mg with minor additions of CoPd NPs (up to 5 wt.%) was investigated using the 4-point method. The samples were prepared by mixing nanosized reinforcements with Mg micropowder followed by cold pressing. The employed CoPd NPs were synthesized via a colloidal reduction method.

Temperature and concentration dependencies of the electrical conductivity revealed a difference in values caused by CoPd NPs additions. Scanning electron microscopy and X-ray diffraction showed the impact of CoPd NPs on the structure of pure Mg.

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