

Review of: "Investigating the Mechanical and Tribological Effects of MoS₂ Reinforcement in AZ91 Magnesium Alloy: A Comprehensive Experimental Study"

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Potential competing interests: No potential competing interests to declare.

The methodology for incorporating MoS₂ into the AZ91 alloy used an innovative hole technique, where 42 holes (2 mm in diameter and 3 mm in depth) were drilled in the alloy and filled with MoS₂ particles. This approach, distinct from the common groove method, was not extensively justified in the paper. The MoS₂ particles were ground to the appropriate size, but specific details on the grinding process were not provided. An H-13 tool with an 18 mm wide shoulder and a 3.2 mm length and 6 mm width pin was used for friction stir processing (FSP) at optimized parameters: 1100 rpm rotation speed, 15 mm/min travel speed, and 10 kN load. While these parameters are well-documented, their selection rationale could be elaborated. The methodology includes microstructural analysis to evaluate reinforcement distribution, though additional details on the analysis techniques would enhance the study. Improvements could include a comparative justification for the hole technique, detailed grinding process information, a uniform filling technique, processing parameter justification, and detailed microstructural analysis criteria.

What specific parameters were used in the friction stir processing (FSP) of the AZ91 magnesium alloy?

How was MoS₂ incorporated into the AZ91 alloy during the FSP process, and why was this method chosen?

What were the key findings regarding the hardness of the FSP-treated AZ91 alloy with MoS₂ reinforcement?

How did the addition of MoS₂ affect the tensile strength and microstructure of the magnesium alloy?

How do the authors interpret the relationship between the processing parameters and the observed mechanical properties of the alloy?

What future research directions do the authors suggest to further investigate the properties and applications of MoS₂-reinforced magnesium alloys?