

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.

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

The author has studied an important scientific problem statement in friction stir processing, as this research study investigates the impact of the processing parameters on the friction stir processing (FSP) of AZ91 and a Mg alloy reinforced with MoS₂, in which the microstructure of the FSP-treated zone was analyzed to understand the grain size, morphology, and potential presence of intermetallic phases, and tensile testing was conducted to assess the strength, ductility, and overall tensile behavior of the material.

The results obtained showed that the combination of the AZ91 Mg alloy and MoS₂ reinforcement led to enhanced surface hardness and improved wear resistance. In general, the results are presented in a well professional way, although the graphs as well as the figures illustrated need to be more clear and intensively enhanced. The research work in general is novel, and the discussion is excellently analyzed.

In my opinion, the proposed manuscript and the submitted research work are an added value for the scientific community who are interested, especially in the field of NMMC using FSP and studying its optimization of parameters.

Meanwhile, I would highly recommend the author to put into his consideration to add and cite the following references and review articles, which could add to his research work a lot:

- Mostafa M. El-Sayed, A.Y. Shash, Ehab A. El-Danaf, M. Abd-Rabou, Mahmoud G. ElSherbiny, "Fabrication of biocompatible Mg-based nanocomposites by using friction stir alloying", *Ceramics International*, Elsevier Ltd., Accepted 22 April 2023.
- Mostafa M. El-Sayed, A.Y. Shash, Ehab A. El-Danaf, M. Abd-Rabou, Mahmoud G. ElSherbiny, "Impact of Multi-Pass Friction Stir Alloying On The Characterization of Mg-Based Bio-Ceramic Nanocomposites", *Journal of Alloys & Compounds*, Elsevier Ltd., Accepted 6 May 2023.