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

Manish Singh[1]

1 University of Allahabad

Potential competing interests: No potential competing interests to declare.

The present manuscript entitled “Investigating the Mechanical and Tribological Effects of MoS2 Reinforcement in AZ91 Magnesium Alloy: A Comprehensive Experimental Study” investigates the effect of the addition of MoS_2 particles on the process of formation of a nanocomposite with a Mg-alloy on the microstructure and some mechanical properties. This study looks promising as the authors chose a modified FSP technique here, which may be beneficial for researchers in the area. The general comment about the MS is that figure representation is poor. The following specific points need to be incorporated or addressed before this MS may be considered for publication:

1. The final few sentences of the abstract need modification because, in the current form, they give the impression about the experimental methods. Authors should put in the results and findings of the study therein to attract readers to the work. Moreover, the sentence “The optimal processing conditions were as follows: rotation speed of 1100 rpm, travel speed of 15 mm/min, load of 10 kN, and use of a tungsten carbide tool material owing to its exceptional strength and durability. The surface microstructures and tensile strengths of the FSP-treated areas were analyzed further.” is repeated in the abstract as well as in the introduction section of the MS.

2. In the experimental section, authors say, “This is only one of the many interesting and perhaps helpful sections of the text.” This does not convey anything. Moreover, a lot has been said about properties of MoS2 without references such as band gap, optical applications, nano-sheets, 2H-1T phase transformation, etc. Authors need to cite several papers for the MoS_2 part. A few suggestions are:

a. Q. H. Wang, K. Kalantar-Zadeh, A. Kis, J. N. Coleman, and M. S. Strano, Nat. Nanotechnol., 2012, 7, 699.

b. Singh M K, Chettri P, Tripathi A, Tiwari A, Mukherjee B, and Mandal R K ,*Phys Chem Chem Phys* **20** 15817-23.

c. H. J. Conley, B. Wang, J. I. Ziegler, R. F. Haglund Jr, S. T. Pantelides, and K. I. Bolotin, Nano Lett., 2013, 13, 3626–3630.

3. In Table 1, it is not clear if the composition of MoS_2 nanoparticles is in wt% or atom%? At first instance, how do the authors say that this is MoS2? Please clarify.

4. Figure 1. The caption is too small: “FSP tool and setup.” Please label and elaborate on the caption for better readability.

5. Why is the tensile curve of sample 1 different from those of samples 2 and 3?

5. Section should be "Results and Discussion." The optical micrographs shown in Figs. 3, 4, and 5 are without scale bars (micron markers), so authors need to put them there. How many grains were counted to estimate the grain size in each sample under this study?

6. In SEM analysis, authors talk about elemental composition by EDS in Figures 6 and 7, but these are SEM images without EDS spectra. Please incorporate spectra and corresponding elemental composition in the revised MS. In addition to this, microstructures are different at fracture zones. Authors need to discuss this and compare the samples with their tensile behaviour.