Review of: "The Influence of Hot Extrusion on The Mechanical and Wear Properties of an Al6063 Metal Matrix Composite Reinforced With Silicon Carbide Particulates"

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Potential competing interests: No potential competing interests to declare.

1. Introduction section

-A.M. Xavior et al…….A.M. should be removed. Xavior et al…….is enough.

- 'Wear coefficient', please check this term. It is either wear resistance/friction coefficient. I have never heard about wear coefficient.

-'When a composite is composed of a base aluminum matrix alloy in a dry lubricated condition, the coefficient of friction was significantly reduced.' Meaning not clear. Please reframe the sentence.

- 'In light of the foregoing, the current study aims to characterize aluminium 6063 matrix composites reinforced with silicon carbide in powder form of lab grade with weight fractions ranging from 0 to 8wt%. For developing composites, the liquid metallurgy route stir casting technique was employed.' The sentence is confusing. Request to divide the sentence.

2. Experimental work section

- Section '2.1. Fabrication of the composite' is a wrong subheading for the whole experimental procedure. May be removed.

- Aluminum ingot composition and supplier name need to be mentioned.

- Silicon carbide size and supplier name need to be mentioned.

- Mechanical stirrer material and geometry need to be mentioned.

- Permanent mould material and dimensions need to be mentioned.

- Extrusion temperatures are mentioned differently in the experimental and abstract sections. Needs to be corrected.

- Tensile and compression test parameters need to be mentioned.

- Wear test rig company and model number need to be mentioned.

- Wear test time and counter material name need to be mentioned.

3. Results and discussion section

3.1. Density and porosity

-‘ Due to differences in the density and mechanical structure of crystals and the atomic arrangement in ceramic reinforcements, density exhibits a relative enhancement with the increasing weight fraction of reinforcement.’ This is not clear. Please elaborate. Because of the same reasons, why the density is not decreasing?

-‘ It was noticed that the porosity of the composite is mainly influenced by the particle size of ceramic reinforcements.’ Please mention how? There is no result related to this. In fact, the size of SiC particles has not been mentioned.

-‘ Porosity is also increased due to the inhomogeneity of the alloy and the reinforcing element at the atomic level’. The reason is not convincing. How inhomogeneity is responsible for porosity? How the constituents in a composite are related at the atomic level?

3.2. Tensile test results

- ‘Tensile tests were performed under controlled conditions on composites containing varying weight fractions of SiC reinforcements of 2%, 4%, 6%, and 8%, as shown in Fig. 1.’ This figure does not show tensile tests; rather, the fractured specimens obtained after tensile testing.

-‘ The ASTM E-8 standard was followed in the test, and testing standards were carefully studied.’ In the experimental section, a different standard has been mentioned. Also, what does the second part of the sentence mean?

-‘ The elasticity modulus of composites with SiC reinforcement had a significant effect on tensile strength.’ Meaning not clear.

3.3. Compression test

-Fig. 2, a picture of a scale should also be placed along with samples for dimension prediction.

- ‘The crushing of SiC-reinforced composites was observed to be steady due to the optimal mixture of SiC into the aluminum alloy.’ Meaning not clear.

- ‘The fracture behavior of silicon carbide-reinforced composites was found to be identical to that of the as-cast condition, with progressive integration of SiC reinforcement resulting in a harder and stronger material under compression.’ Meaning not clear, please re-write.

3.4. Vickers hardness test

- ‘Doping. is not a proper word for reinforcement addition. Please change.

- Fig. 3, the photograph is not clear. Also, please put a scale to get an idea about sample size.

3.5. Impact test

- '…densification of the material increased hardness…'. What does densification refer to? Increase in density? Porosity is found to increase with increasing reinforcement.

- '…resulted in crack propagation by intergranular augmentation…'. What does the term 'intergranular augmentation' refer to?

-What does the term, 'distortion of impact strength' refer to?

- '…which has resulted in atomic bonding…'. What does this mean? Atomic bonding between which elements?

3.6. Adhesive wear test

- It is mentioned,' Similar observations have been made by other studies.' However, no observations have been mentioned.

- 'Graphs 11-13 show the wear rate and coefficient of friction for various loads for a composite reinforced with SiC with various weight fractions under 'as-cast' conditions.' This should be corrected as the graphs are for extruded conditions.

-The meaning of the sentence,' The wear rate is almost linear as the applied load is still considered as a lighter load,' is not clear.

-It is mentioned,' The wear rate is linearly reduced…'. It cannot be considered as a linear reduction. Please check the graph. Linear relation is when the same % variation in x (cause) leads to the same % variation in Y (effect).

3.7. Surface morphology study of wear

- All figures are of poor quality and also without scale marks.

- Figures have been mentioned as graphs.

- Flash and wedges are not shown in figures, but mentioned in the text.

-What does 'residual wear track' mean?

- Figure 17 does not show ridges and grooves and has been mentioned as the reason for the reduced wear rate.

-How do mild deformation and adhesive transfer confirm that wear debris primarily consists of fine particles?

- It is mentioned, 'It indicates adhesive wear behavior by showing material transfer from the counterpart material to the composite surface or vice versa,' without providing any evidence.

4. Conclusion

- It is mentioned 'grains were noticeably refined,' but no proof is provided in the results and discussion section. The second part of the same conclusion, 'the reinforcement layers were considerably dissolved, reflecting the effective diffusion and doping of reinforcement atoms into the Al 6063 matrix,' is also completely wrong. May be suitably

modified/removed.

Reference section should incorporate citations from the last three years. All the references are 2020 or earlier.