Supplementary material

Table S1. Data on the microhardness of composites based on alloys of the 6xxx series obtained by the FSP method.

S. No.	Matrix/ Reinforcement	Microhardness of base metal, HV	Microhardness of composite, HV	Reference
1	AA6082/Al_2O_3	67	295	[32]
2	AA6063/NiO	82	253	This work
3	AA6061-T6/(Al_2O_3/SiC)	107	156	[33]
4	AA6061/Ti_3AlC_2	60	150	[34]
5	AA6082/SiC	64	150	[35]
6	AA6082/TiC	60	149	[36]
7	AA6063/SiO_2	63	135	[37]
8	AA6061-T6/TiB_2	103.5	135	[38]
9	AA6061/Ni	95	130	[3]
10	AA6061/Fly Ash	65	125	[39]
11	AA6061/(SiC/Gr)	100	125	[40]
12	AA6063/W	74	120	[41]
13	AA6061/(Al_2O_3/CNTs)	55	108.4	[42]
14	AA6061/CNT	55	90.6	[42]
15	AA6061-T6/B_4C	50	88	[17]
16	AA6063-T4/(ZrO_2/Ni)	54	85.2	[43]
17	AA6061/NiO	100	75	[28]
18	AA6061-T6 /AlCoCrFeN	56	72	[44]
19	AA6061/Gr	90	65	[45]

References

32. A. Shafiei-Zarghani, S. F Kashani-Bozorg, A. Zarei-Hanzaki, Microstructures and mechanical properties of Al/Al_2O_3 surface nano-composite layer produced by friction stir processing, Mater. Sci. Eng. A 500 (2009) 84 – 91.
33. N. Parumandla, K. Adepu, Effect of Al_2O_3 and SiC nano reinforcements on microstructure, mechanical and wear properties of surface nanocomposites fabricated by friction stir processing, Mater. Sci. (Medžiagotyra) 24 (3) (2018) 338 – 344.
34. V. Desai, V. Badheka, A. B. Zala, T. Parekh, N. I. Jamnapara, Fabrication of Al6061/Ti_3AlC_2 MAX phase surface composite by friction stir processing and investigation of wear properties, Tribology Int. 195 (2024) e109594.
35. M. Sivanesh Prabhu, A. Elaya Perumal, S. Arulvel, Development of multi-pass processed AA6082/SiC_p surface composite using friction stir processing and its mechanical and tribology characterization. Surf. Coat. Technol. 394 (2020) e125900.
36. A. Thangarasu, N. Murugan, I. Dinaharan, S. J. Vijay, Synthesis and characterization of titanium carbide particulate reinforced AA6082 aluminium alloy composites via friction stir processing, Arch. Civ. Mech. Eng. 15 (2015) 324 – 334.
37. S. J. Abraham, S. C. R. Madane, I. Dinaharan, J. Baruch, Development of quartz particulate reinforced AA6063 aluminum matrix composites via friction stir processing, J. Asian Ceram. Soc. 4 (4) (2016) 381 – 389.
38. C. M. Rao, K. M. Rao, Abrasive wear behaviour of TiB_2 fabricated aluminum 6061, Mater. Today: Proc. 5 (2018) 268 – 275.
39. I. Dinaharan, R. Nelson, S. J. Vijay, E. T. Akinlabi, Microstructure and wear characterization of aluminum matrix composites reinforced with industrial waste fly ash particulates synthesized by friction stir processing, Mater. Charact. 118 (2016) 149 –158.
40. D. Aruri, K. Adepu, K. Adepu, K Bazavada, Wear and mechanical properties of 6061-T6 aluminum alloy surface hybrid composites [(SiC+Gr) and (SiC+Al_2O_3)] fabricated by friction stir processing, J. Mater. Res. Technol. 2 (4) (2013) 362 – 369.
41. L. F. Ali, N. Kuppuswamy, R. Soundararajan, K. R. Ramkumar, S. Sivasankaran, Microstructural and wear behaviour of Al 6063-W nanocomposites developed using friction stir processing, Met. Mater. Int. 27 (2021) 5462 – 5473.
42. Z. Du, M. J. Tan, J. F. Guo, G. Bi, J. Wei, Fabrication of a new Al-Al_2O_3-CNTs composite using friction stir processing (FSP), Mater. Sci. Eng. A 667 (2016) 125 –131.
43. M. Patel, B. Chaudhary, J. Murugesan, N. K. Jain, V. Patel, Enhancement of tensile and fatigue properties of hybrid aluminium matrix composite via multipass friction stir processing, J. Mater. Res. Technol. 21 (2022) 4811– 4823.
44. P. Li, Y. Tong, X. Wang, Y. S. Sato, H. Dong, Microstructures and mechanical properties of $AlCoCrFeNi_{2.1}$/6061-T6 aluminum-matrix composites prepared by friction stir processing, Mater. Sci. Eng. A 863 (2023) e144544.
45. K. Venkateswara Reddy, R. Bheekya Naik, Golla Rama Rao, G. Madhusudhan Reddy, R. Arockia Kumar, Microstructure and damping capacity of AA6061/graphite surface composites produced through friction stir processing. Compos. Commun. 20 (2020) e100352.