

Supplementary data for Wear and Thermal Resistance Properties of Epoxy Aluminum Particulate Micro Composite

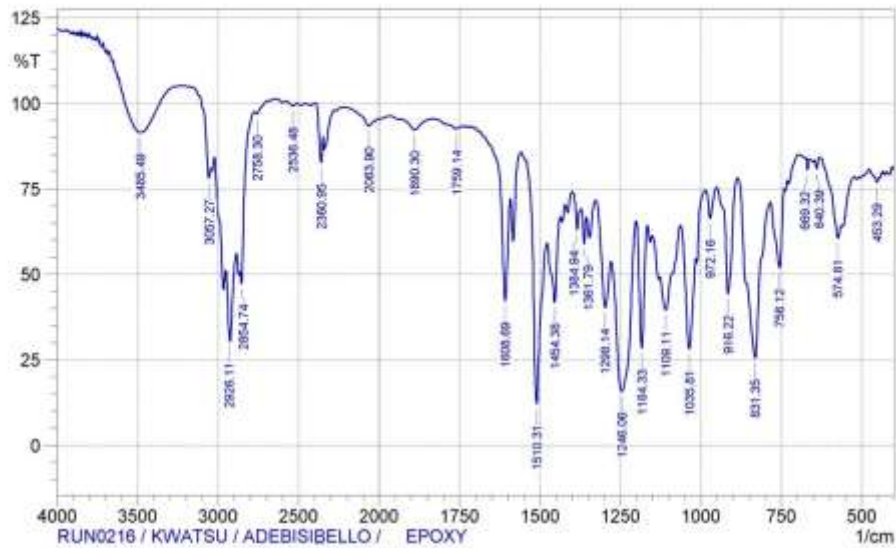
by

Sefiu Adekunle Bello

¹Department of Materials Science and Engineering, Kwara State University, Malete, Nigeria

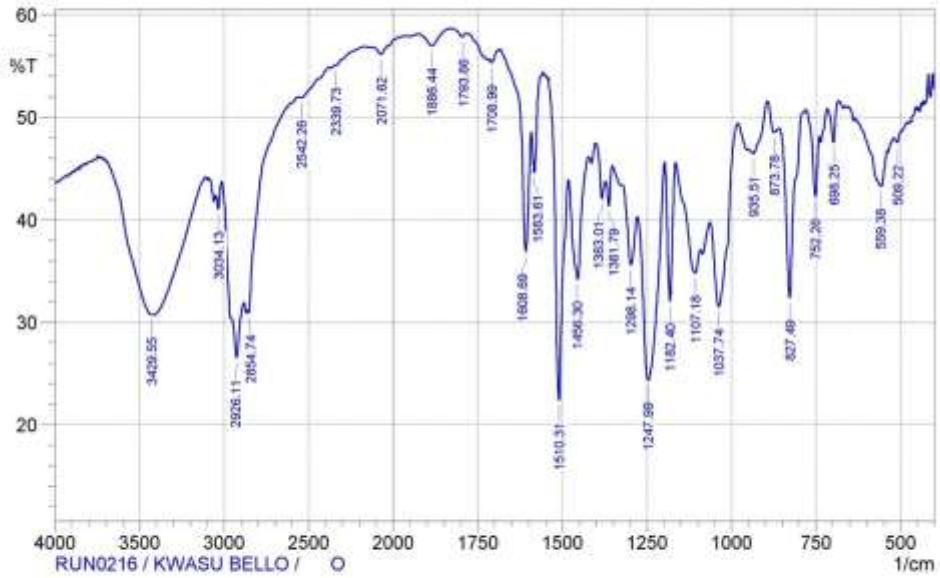
^{a*}belloshaafiu@gmail.com, ^{a*}sefiu.bello@kwasu.edu.ng

Figure 2: DGEBA



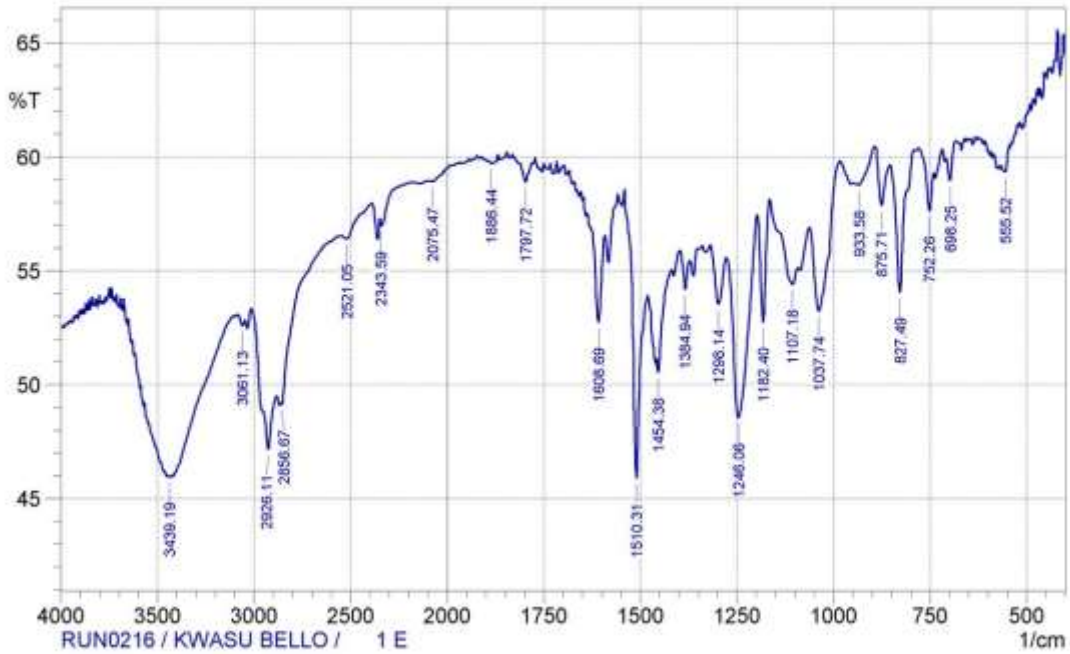
Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area	
1	453.29	76.88	2	479.36	445.57	3.41	0.14
2	574.81	60.6	7.45	630.74	561.3	9.78	0.47
3	640.39	80.83	2.95	648.17	630.74	1.28	0.1
4	669.32	80.47	3.49	673.18	659.68	1.11	0.08
5	756.12	51.96	21.66	783.13	740.69	9.02	3.23
6	831.35	25.49	30.66	868.35	785.05	25.07	7.98
7	916.22	44.23	32.66	950.94	887.26	12.51	5.21
8	972.16	65.36	8.51	985.66	950.94	5.08	0.75
9	1035.61	28.17	30.43	1052.81	1016.52	17.05	6.44
10	1109.11	39.59	10.04	1126.47	1089.82	12.97	1.84
11	1184.33	28.39	36.47	1199.76	1166.97	11.06	4.89
12	1246.06	15.86	42.92	1278.85	1201.69	39.5	22.11
13	1298.14	40.27	20.01	1327.07	1280.78	13.08	3.35
14	1361.79	58.89	8.73	1371.43	1356	3	0.4
15	1384.94	63.12	8.3	1400.37	1371.43	4.67	0.46
16	1454.36	41.85	21.53	1477.52	1437.02	11.33	3.17
17	1510.31	12.17	58.81	1541.16	1479.48	23.17	13.44
18	1608.69	42.24	33.7	1653.05	1593.25	9.95	3.93
19	1759.14	92.52	0.82	1772.64	1747.57	0.81	0.06
20	1890.3	92.25	3.47	1965.53	1844.01	3	0.75
21	2063.9	93.31	3.05	2212.43	2004.11	3.46	0.77
22	2360.95	82.7	10.25	2391.81	2349.38	1.87	0.93
23	2536.48	99.23	0.98	2573.13	2513.33	0.05	0.13
24	2758.3	96.84	1.35	2775.66	2692.72	0.48	0.14
25	2854.74	47.33	8.55	2864.39	2775.66	9.46	-4.07
26	2926.11	30.46	22.54	2951.19	2887.53	23.81	6.52
27	3057.27	78.12	5.83	3149.86	3043.77	2.68	-1.16
28	3485.49	91.47	0.02	3489.34	3483.56	0.22	0

Figure 2: Epoxy polymer



Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area	
1	509.22	47.521	0.301	511.15	499.58	3.682	0.009
2	559.38	43.279	4.119	632.67	540.09	30.919	1.599
3	698.25	47.57	3.684	717.54	682.82	10.503	0.412
4	752.26	42.237	6.655	779.27	740.69	12.742	0.906
5	827.49	32.406	17.188	858.35	790.84	25.026	4.514
6	873.78	48.493	1.465	893.07	860.28	10.072	0.236
7	935.51	46.425	1.601	949.01	895	17.193	0.666
8	1037.74	31.495	11.218	1062.81	981.8	33.581	5.041
9	1107.18	34.821	4.064	1165.04	1091.75	29.948	1.655
10	1182.4	32.051	13.465	1197.83	1166.97	12.73	2.178
11	1247.99	24.353	17.77	1276.92	1199.76	38.518	10.036
12	1298.14	35.607	6.05	1321.28	1279.85	17.517	1.397
13	1361.79	41.318	3.155	1371.43	1352.14	7.032	0.243
14	1383.01	42.049	3.072	1402.3	1371.43	10.837	0.297
15	1456.3	34.216	10.637	1481.38	1423.51	23.182	3.13
16	1510.31	22.436	26.074	1541.18	1483.31	24.864	6.637
17	1583.61	44.804	5.29	1591.33	1558.54	9.861	0.492
18	1608.69	36.686	12.964	1681.98	1593.25	27.009	2.159
19	1708.99	55.33	0.613	1716.7	1693.56	5.877	0.061
20	1793.86	57.853	0.426	1826.65	1794.21	9.968	0.056
21	1886.44	56.949	1.34	1921.16	1844.01	18.438	0.368
22	2071.62	56.134	0.74	2114.05	2033.04	20.082	0.224
23	2339.73	55.056	0.018	2341.66	2335.87	1.499	0.001
24	2542.26	51.874	0.251	2555.77	2434.25	33.763	0.098
25	2854.74	30.924	0.852	2862.46	2802.06	90.449	-13.117
26	2926.11	26.595	4.437	2956.97	2883.68	39.084	1.959
27	3034.13	41.037	1.935	3047.63	3016.77	11.579	0.297
28	3429.55	30.729	0.068	3444.98	3425.69	9.864	0.017

Figure 2: Epoxy-Almp



Peak	Intensity	Corr. Intensity	Base (H)	Base (L)	Area	Corr. Area	
1	555.52	59.341	0.752	567.09	545.87	4.759	0.06
2	698.25	58.968	1.253	707.9	682.82	5.595	0.088
3	752.26	57.63	1.982	781.2	740.69	9.225	0.192
4	827.49	54.074	5.829	852.56	792.77	14.289	1.009
5	875.71	57.867	2.228	893.07	854.49	8.819	0.275
6	933.58	58.768	0.242	939.35	893.07	10.447	0.066
7	1037.74	53.228	4.528	1060.88	983.73	19.414	1.371
8	1107.18	54.403	1.356	1165.04	1091.75	18.53	0.396
9	1182.4	52.749	5.027	1197.83	1165.04	8.352	0.554
10	1246.06	48.566	7.736	1276.92	1197.83	22.223	2.629
11	1298.14	53.555	2.281	1319.35	1278.85	10.626	0.374
12	1384.94	54.193	1.477	1396.51	1373.36	6.009	0.121
13	1454.38	50.54	0.994	1458.23	1419.66	10.556	0.063
14	1510.31	45.927	10.091	1541.18	1483.31	16.208	1.657
15	1608.69	52.758	4.074	1635.69	1593.25	10.948	0.566
16	1797.72	58.88	0.864	1813.15	1780.36	7.433	0.097
17	1896.44	59.718	0.046	1890.3	1884.52	1.294	0.001
18	2075.47	58.916	0.012	2088.98	2073.55	3.544	0.001
19	2343.59	56.961	0.389	2347.45	2279.94	16.082	0.092
20	2521.05	56.403	0.106	2526.83	2453.54	17.951	0.029
21	2856.67	49.134	0.24	2862.46	2642.57	59.228	-2.263
22	2926.11	47.171	1.942	2955.04	2883.68	22.489	0.493
23	3061.13	52.591	0.301	3086.21	3049.56	10.165	0.041
24	3439.19	45.952	0.039	3448.84	3437.26	3.906	0.003

Date/Time; 2/25/2016 5:48:51 PM

No. of Scans; 45

Figure 3a: EDX			Figure 3b: EDX			Figure 3c: EDX data	
Energy	Intensities		Energy	Intensities		Energy	Intensities
keV	counts		keV	counts		keV	count
Al particles			Epoxy/Almp			Epoxy	
81			70			67	
0.04893	25.458		0.03401	36.7811		0.03401	36.7811
0.12255	25.5748		0.08332	34.4527		0.08332	34.4527
0.17155	38.3427		0.11624	34.4337		0.11624	34.4337
0.24517	38.4594		0.16562	34.4053		0.16562	34.4053
0.29162	482.689		0.19895	48.1864		0.19895	48.1864
0.36757	89.4143		0.2969	579.439		0.2969	579.439
0.39218	76.7632		0.36064	1067.01		0.36064	1067.01
0.46588	64.1899		0.39919	698.982		0.39919	698.982
0.53965	38.9266		0.39357	508.082		0.39357	508.082
0.60965	648.166		0.36959	252.792		0.36959	252.792
0.63638	280.193		0.45175	248.144		0.45175	248.144
0.68651	102.61		0.46801	241.235		0.46801	241.235
0.78497	52.0059		0.53419	252.697		0.53419	252.697
0.95652	90.3485		0.56806	284.878		0.56806	284.878
1.15291	77.9699		0.60186	314.759		0.60186	314.759
1.1773	103.389		0.63384	282.54		0.63384	282.54
1.29955	179.724		0.62882	112.34		0.62882	112.34
1.39725	256.02		0.661	87.0214		0.661	87.0214
1.39643	395.611		0.69331	66.3025		0.69331	66.3025
1.39507	624.032		0.72549	40.9835		0.72549	40.9835
1.39402	801.693		0.79133	40.9457		0.79133	40.9457
1.39304	966.663		0.85717	40.9078		0.85717	40.9078
1.41615	1207.81		0.90655	40.8794		0.90655	40.8794
1.39078	1347.37		0.95607	45.451		0.95607	45.451
1.38965	1537.72		1.02171	38.5132		1.02171	38.5132
1.35088	3936.1		1.0713	45.3848		1.0713	45.3848
1.44904	3936.25		1.1534	38.4375		1.1534	38.4375
1.47012	4520.04		1.20291	43.0091		1.20291	43.0091
1.51928	4507.42		1.30147	36.0523		1.30147	36.0523
1.5938	4355.26		1.36752	42.9144		1.36752	42.9144
1.57287	3746.1		1.43316	35.9765		1.43316	35.9765
1.60095	3149.7		1.48281	45.1481		1.48281	45.1481
1.5865	1449.2		1.5326	58.9198		1.5326	58.9198

1.6163	560.932		1.58435	139.391		1.58435	139.391
1.73908	548.436		1.61517	68.0724		1.61517	68.0724
1.78861	472.374		1.64749	47.3535		1.64749	47.3535
1.86426	129.859		1.72965	42.7062		1.72965	42.7062
2.03649	53.9911		1.84467	35.7399		1.84467	35.7399
2.25735	54.3415		1.89406	35.7115		1.89406	35.7115
2.40466	41.885		1.95983	33.3737		1.95983	33.3737
2.57636	54.8475		2.00921	33.3453		2.00921	33.3453
2.72375	29.701		2.1245	35.579		2.1245	35.579
2.8953	68.0436		2.20688	37.8317		2.20688	37.8317
3.09154	81.0451		2.27272	37.7938		2.27272	37.7938
3.26332	81.3176		2.35489	33.1465		2.35489	33.1465
3.45964	81.629		2.43726	35.3992		2.43726	35.3992
3.58219	107.204		2.5033	42.2613		2.5033	42.2613
3.65558	145.391		2.55255	37.6329		2.55255	37.6329
3.62886	513.363		2.63485	37.5856		2.63485	37.5856
3.75163	500.868		2.70083	42.1477		2.70083	42.1477
3.80297	120.244		2.75116	74.3193		2.75116	74.3193
3.95036	95.0976		2.76708	55.9099		2.76708	55.9099
4.09774	69.951		2.79946	37.4909		2.79946	37.4909
4.24506	57.4945		2.89822	37.4342		2.89822	37.4342
4.41661	95.8372		2.96379	28.1963		2.96379	28.1963
4.46433	324.336		3.04596	23.549		3.04596	23.549
4.51221	527.455		3.37517	23.3597		3.37517	23.3597
4.61195	261.119		3.58916	23.2366		3.58916	23.2366
4.58839	96.1097		3.68793	23.1798		3.68793	23.1798
4.73585	58.2731		3.7537	20.842		3.7537	20.842
4.85847	71.1578		3.88539	20.7663		3.88539	20.7663
5.03018	84.1203		3.96769	20.7189		3.96769	20.7189
5.30026	59.1684		3.98415	20.7095		3.98415	20.7095
5.47204	59.4409		3.98415	20.7095		3.98415	20.7095
5.6929	59.7912		4.00061	20.7		4.00061	20.7
5.96261	98.2896		4.04999	20.6716		4.04999	20.6716
6.28162	98.7956		4.04999	20.6715		4.04999	20.6716
6.33025	175.014		4.04999	20.6715			
6.30541	225.735		4.04999	20.6716			
6.42856	149.789		4.04999	20.6715			
6.52702	99.1849						
6.67433	86.7284						
6.84611	87.0009						
7.06704	74.6611						

7.06704	74.6611						
7.06704	74.6611						
7.26328	87.6626						
7.53314	100.781						
7.77862	88.4801						
7.926	63.3335						
7.87723	12.4954						

Figure 4a: Coefficient of friction with sliding distance				
Epoxy			Epoxy-Almp	
Sliding distance	CoF		Sliding distance	CoF
0	0		0	0
79.4507	0.103456		79.4507	0.053456
203.3451	0.131595		303.3451	0.101595
357.6213	0.157895		510.2959	0.118943
652.0651	0.231579		804.7396	0.182379
924.6982	0.326316		1088.278	0.343612
1208.237	0.344737		1360.911	0.385903
1480.87	0.384211		1644.45	0.38326
1786.219	0.402632		1906.178	0.388546
2058.852	0.531579		2211.527	0.404405
2342.391	0.457895		2473.254	0.457269
2625.929	0.384211		2778.604	0.436123
2898.562	0.373684		3051.237	0.388546
3171.195	0.365789		3334.775	0.364758
3465.639	0.344737		3607.408	0.404405
3760.083	0.328947		3923.663	0.37533

Figure 4b: Average wear rates at different velocities and applied loads			
Weight fraction (Am)	Wear Rate	Wear Rate	Wear Rate
%	gm ⁺ (-1)	%	gm ⁺ (-1)
	@9N_0.65m/s	@9N_1.3m/s	@25N_1.3m/s
0	0.02067	0.02445	0.02445
10	0.00795	0.01025	0.01479