

LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation	Description
MMCs	Metal matrix composites
pMMCs	Particle-reinforced metal matrix composites
MA	Mechanical alloying
CC	Cast copper
HC-1	Hybrid composite-1
HC-2	Hybrid composite-2
HC-3	Hybrid composite-3
HC-4	Hybrid composite-4
HC-5	Hybrid composite-5
HC-6	Hybrid composite-6
HC-7	Hybrid composite-7
HC-8	Hybrid composite-8
PM	Powder metallurgy
CuO	Copper oxide
PMCs	Polymer matrix composites
CFRP	Carbon fiber-reinforced polymer
GFRP	Glass fiber-reinforced polymer
CMCs	Ceramic matrix composites
CCCs	Carbon-carbon composites
μm	Micro meter
PVD	Physical vapor deposition
CVD	Chemical vapor deposition

DRMMC	Discontinuously reinforced metal matrix composites
DEM	Differential effective medium
SEM	Scanning electron microscope
HRSEM	High resolution scanning electron microscope
TEM	Transmission electron microscope
MWCNTs	Multi-walled carbon nano tubes
PSR	Particle size ratio
CNTs	Carbon nano tubes
MPa	Mega Pascal
EDS	Energy dispersive spectroscopy
TGA	Thermo gravimetric analysis
PM	Powder metallurgy
GPa	Gega pascal
σ	Flow stress
σ_0	Friction stress
k	Hall-Petch coefficient
σ_c	Strength of the composite
σ_f	Strength of the reinforcement
σ_m	Strength of the matrix
V_f	Volume fractions of the reinforcement
V_m	Volume fractions of the matrix
σ_{ym}	The yield stress of the unreinforced matrix
DMMCs	Diamond reinforced metal matrix composites
ROM	Rule of mixture
ΔCTE	Difference in the coefficients of thermal expansion

M	Taylor factor
ASTM	American society for testing and materials
G	Shear modulus of the matrix
b	Burgers vector of the matrix
ν	Poisson's ratio
r_s	Effective radius of the particles
r_o	Cut-off radius
λ	The mean inter-particle separation on the slip plane
$\Delta\sigma$	Increase in yield strength
ρ	Increase in dislocation density over that of the matrix density
β	Geometric constant
CTE	Coefficient of thermal expansion
A_r	Real area of contact
W	Normal load
H	Hardness of the softer surface
Q	Volume of material wearing out for a unit distance of sliding
K	Wear coefficient or the coefficient of wear
F	Frictional force
μ	Coefficient of friction
F_{adh}	Frictional force due to adhesion
F_{def}	Frictional force due to deformation
m/s or $m.s^{-1}$	Meter per second
N	Newton
nm	Nano meter
wt%	Weight percentage

vol. %	Volume percentage
R_a	Average roughness
R_q	Root mean square roughness
R_z	Average maximum height from individual peak to valley
R_t	Maximum distance between the highest peak and the lowest valley
R_{pk}	Reduced peak height corresponding to the areas of most rapid wear
R_k	Core roughness depth corresponding to long term running surface
R_{vk}	The valley depth indicated the oil retaining capability of the surface
t_p	The bearing or material ratio
IACS	International annealed copper standards
Ω	Ohm
cm	Centimetre
m	Meter
s	Second
TiC	Titanium carbide
SiO ₂	Silicon oxide or silica
WC	Tungsten carbide
SiC	Silicon carbide
Al ₂ O ₃	Alumina
TiB ₂	Titanium diboride
cBN	Cubic boron nitride

hBN	Hexagonal boron nitride
ZrO ₂	Zirconia
BN	Boron nitride
B ₄ C	Boron carbide
Cr	Chromium
HP	Horse power
rpm	Rotation per minute
^o C	Degree Celsius
XRD	X-ray diffraction
mA	Milli-ampere
Å	Angstrom
d	The inter planner spacing
JCPDS	Joint committee on powder diffraction standards
θ	The incident Bragg's angle
λ	The wavelength of the X-ray
n	An integer representing the order of the diffraction
ε	Lattice strain
k	The shape factor
hkl	Miller indices
EDAX	Energy dispersive analysis X-ray
W _a	Weight of hybrid composites in air
W _w	Weight of hybrid composites in water
g	gram
kg	Kilo-gram
mm	millimetre

BHN	Brinell hardness number
P	Load
D	Diameter of the ball
d	The average impression diameter of indentation
USA	United state of America
mm/min	millimetre per minute
I	Current
V	Voltage
R	Resistivity
ρ	Conductivity
HRC	Rockwell Hardness measured on the C scale
min	Minute
AFM	Atomic force microscope
FWHM	Full width at half maxima
CSL	Coincidence site lattice
W-H	Williamson–Hall
UTS	Ultimate tensile strength
POD	Pin-on-disc
V	Average cumulative volume loss
S	Sliding distance