

Appendix A. ACRONYMS AND ABBREVIATIONS

2-D	two-dimensional
3BOB	three ball-on-ball
3BOR	three ball-on-rod
3-D	three-dimensional
ACEM	aberration-corrected electron microscope
ACERT	Advanced Combustion Emissions Reduction Technology
ADF	annular dark-field
AE	acoustic emission
AFM	atomic force microscope
AFRL	Air Force Research Laboratory (Wright-Patterson Air Force Base, Dayton, Ohio)
AIST	(National Institute of) Advanced Industrial Science and Technology (Nagoya, Japan)
Al	aluminum
AMCL	Advanced Materials Characterization Laboratory
ANL	Argonne National Laboratory
ANSYS	commercial finite-element analysis software
ASM	American Society for Metals
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
Ba	barium
BAM	Bundesanstalt für Materialforschung und -prüfung (Berlin, Germany)
BET	Brunauer-Emmett-Teller theory
BMOs	Base metal oxides
BU	Bournemouth University (United Kingdom)
CARES	Ceramics Analysis and Reliability Evaluation of Structures
CC	current collector
CCVD	combustion chemical vapor deposition
CDF	cumulative distribution function
CEN	Committee for European Normalization
CerSaT	Ceramic Science and Technology
CERT	Committee on Energy Research and Technology
CHIP	cold + hot isostatic pressing
CIM	chemically interactive material
CMM	coordinate measuring machine
CP	commercially pure
CRADA	cooperative research and development agreement
CRT	continuously regenerating technology
CTE	coefficient of thermal expansion
CVD	chemical vapor deposition
CWRU	Case Western Reserve University
DDC	Detroit Diesel Corporation
DISI	direct-injection spark-ignition
DITS	dynamic indentation test system
DOE	U.S. Department of Energy

DPF	diesel particulate filter
DRIFT	diffuse reflectance infrared Fourier transform spectroscopy
DSC	dispersion-strengthened composite
DT	deformation twin
DTA	differential thermal analyzer
EDM	electro-discharge machining
EDS	energy-dispersive spectroscopy
EERE	Office of Energy Efficiency and Renewable Energy
EGR	engine gas recirculation
EPA	U.S. Environmental Protection Agency
EPMA	electron probe microanalysis
EVD	electrochemical vapor deposition
FCVT	FreedomCAR and Vehicle Technologies
FEA	finite element analysis
FEM	finite element method
FEM	finite element method/finite element modeling
FTIR	Fourier transform infrared spectroscopy
FY	fiscal year
GPa	gigapascals
HA-ADF	high-angle annular dark-field
HA-ADG	high-angle annular dark field
HC	hydrocarbons
HDI	high-density infrared
HFIR	High Flux Isotope Reactor
HIP	hot isostatic pressing
HIPed	hot isostatically pressed
HS	high stress
HSWR	High-Strength Weight-Reduction Materials Program
HTML	High Temperature Materials Laboratory
HVOF	high velocity oxygen-fuel
IA	implementing agreement
IA-AMT	Implementing Agreement for a Programme of Research and Development on Advanced Materials for Transportation Applications
IEA	International Energy Agency
IEST	integrated engineered surface technology
IITS	instrumented indentation test system
INL	Idaho National Engineering and Environmental Laboratory
ISO	International Organization for Standards
JIS	Japan Industrial Standards

LabVIEW	Programming software made by National Instruments
LANL	Los Alamos National Laboratory
LBNL	Lawrence Berkeley National Laboratory
LNT	lean NO _x trap
LS	low stress
LST	laser surface texturing
METI	Ministry of Economy, Trade and Industry (Japan; formerly MITI)
Mg	magnesium
MMC	metal matrix composite
NASA	National Aeronautics and Space Administration
NDE	nondestructive evaluation
NiAl	nickel aluminide
NiCr	nickel chromium
NiCrFe	nickel chromium iron
NIST	National Institute for Standards and Technology
NIST	National Institute of Standards and Technology
NO _x	oxides of nitrogen; nitrites/nitrates species
NPD	neutron powder diffraction
NPL	National Physical Laboratory (UK)
NSF	National Science Foundation
NSR	NO _x stoichiometric ratio
NTN	NTN Bower
NTRC	National Transportation Research Center
OBD	on-board diagnostic
OFCVT	Office of FreedomCAR and Vehicle Technologies
OFHC	oxygen-free high-conductivity
OM	optical microscopy
ORNL	Oak Ridge National Laboratory
PBC	phosphate-bonded composite
PCA	principal component analysis
PDS	probabilistic design system
PI	principal investigator
PM	particulate matter
PMT	photomultiplier tube
PNNL	Pacific Northwest National Laboratory
PoT	pin-on-twin oscillating wear test
Pt	platinum
PZT	lead zirconate titanate
RBS	rotary bend strength
RCF	rolling contact fatigue
RE	reference electrode

SAcM	scanning acoustic microscopy
SAM	scanning auger microprobe
SAXS	small angle x-ray scattering
SCG	slow crack growth
SCR	selective catalytic reduction
SE	sensing electrode
SEM	scanning electron microscopy
Si ₃ N ₄	silicon nitride
SiC	silicon carbide
SIDI	spark-ignition direct-injection
SIUC	Southern Illinois University–Carbondale
SMPS	scanning mobility particle sizer
SOFC	solid oxide fuel cell
SO _x	sulfur and oxygen containing compounds
SpaciMS	spatially resolved mass spectrometer
SRBSN	sintered reaction-bonded silicon nitride
SRM	standard reference material
SS	stainless steel
STEM	scanning transmission electron microscopy
TBCs	thermal barrier coatings
TEM	transmission electron microscopy
TFS	through focal series
TGA	thermal gravimetric analysis (or analyzer)
Ti	titanium
TiAl	titanium aluminide
TiC	titanium carbide
TTBCs	thick thermal barrier coatings
TTZ	transformation-toughened zirconia
TWC	three-way catalyst
TWS	Third-Wave Systems
UHMW-PE	ultra-high molecular weight polyethylene
UHR-TEM	ultra-high resolution TEM
UTBM	University of Technology at Belfort-Montbéliard
WBDF	weak beam dark field
WC	tungsten carbide
XPS	X-ray photoelectron spectroscopy
XRD	X-ray diffraction/X-ray powder diffraction
YSZ	yttria-stabilized zirconia