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SEMICONDUCTOR TERMS

Symbols

A	symbol for Angstrom
λ	wavelength
µBGA	micro ball grid
µm	micron
µP	microprocessor
µW	microwave; microwatt
100	silicon <100> crystal facet
111	silicon <111> crystal facet

A

AC	alternating current voltage
AES	auger electron spectroscopy
AFM	atomic force microscopy
AI	aluminum
ALE	atomic layer epitxy
ALSiCu	aluminum / silicon / copper alloy
AMU	atomic mass unit
APCVD	atmospheric pressure chemical vapor deposition
APSM	absorptive phase shift mask
Ar	argon
ARC	antireflective coating
ARDE	aspect ratio dependent etching
As	arsenic
ASTM	American Society of Testing and Materials
ASIC	application specific integrated circuit
ATE	automatic test equipment
Au	gold

B

B	boron
B_2H_6	diborane
BARC	bottom antireflective coating
BCC	body-centered cubic crystal
BCI_3	boron trichloride
BEOL	back end of line
BF / DF	bright field / dark field
BGA	ball grid array
BHF	buffered hydrofluoric acid
BiCMOS	bipolar and complimentary metal oxide semiconductor combined into a single IC
BIM	binary intensity mask
Bipolar	two polarities; IC in which both electrons and holes flow
Bit	binary information digit
BJT	bipolar junction transistor
BOE	buffered oxide etch
BPSG	borophosphosilicate glass
BSE	backscattered electron
BSG	borosilicate glass
BSR	ball size ratio

C

C	carbon
CAD	computer-aided design
CAIBE	chemical assisted ion beam etch
CAM	computer-aided manufacturing
CBE	chemical beam epitaxy
CCD	charge-coupled device
CD	critical dimension
CEL	contrast enhancement layer
CERDIP	ceramic dual inline package
CF_4	carbon tetrafluoride, freon-14
CFM	contamination free manufacturing; cubic feet per minute
Cl	chlorine
CL	cathodoluminescence
Class 10	cleanroom classification of 10 particles (0.5 um in diameter) per cubic foot
CMOS	complimentary metal oxide semiconductor
CMP	chemical mechanical planarization; chemical mechanical polish

COB	chip on board
COE	common oxide etch
CPU	central processing unit
CRT	cathode ray tube
CTE	coefficient of thermal expansion
Cu	copper
C-V	capacitance-voltage measurement
CVD	chemical vapor deposition
CZ	Czochralski method of crystal growing
C4/ Flip Chip	controlled collapse chip connection

D

DADBS	diacetoxyditertianrybutoxysilane
DC	direct current
DCS	dichlorosilance
DE100	plasma etch gas mixture of $CF_4/O_2$10%
DESIRE	diffusion enhanced silylating resist
DGEBF	diglycidyl ether of bisphenol
DI	de-ionized water
DI-LDD	double-implant lightly doped drain
DIP	dual inline package
DLTS	deep level transient spectroscopy
DMD	deformable mirror device
DOE	design of experiments
DOF	depth of focus
DR	design rules
DRAM	dynamic random access memory
DSP	digital signal processor
DUF	diffusion under film
DUT	device under test
DUV	deep ultraviolet

E

e-	electron
EBIC	electron beam induced current
EBR	edge bead removal
ECR	electron cyclotron resonance
EDM	electrodischarge machining
EDS	energy-dispersive spectrometer
EDX	energy-dispersive x-ray
EEPROM	electrically erasable programmable read-only memory
EFO	electronic flame-off
EG	electronic grade
EGA	enhanced global alignment
EHS	environmental health and safety
EM	electromigration; electromagnetic
EMP	electron microprobe
E_{max}	maximum exposure level (in a swing curve)
EMI	electromagnetic interference
E_{min}	minimum exposure energy (in a swing curve)
E_o	exposure energy (in a swing curve)
EOT	epitaxy over trench
EPROM	erasable programmable read-only memory
Epi	epitaxy or epitaxial layer
ESCA	electron spectroscopy for chemical analysis
ESD	electrostatic dishcarge
ESO	emergency shut-off
EUV	extreme ultraviolet
eV	electron volt

F

F	fluorine
FA	failure analysis
FCC	face centered cubic; Federal Communication Commision
FEA	finite-element analysis
FEOL	front end of line
FET	field effect transistor
FIB	focused ion beam
FOX	field oxide regions
FPD	focal plane deviation; flat panel display
FPGA	field-programmable gate array
FPP	four-point probe
FTIR	Fourier transform infrared spectroscopy
FZ	float zone

G

GaAs	gallium arsenide
Gb	gigabit
Ge	germanium
GHz	gigahertz
G Line	exposure at 436 nm
GND	electrical ground
GOI	gate oxide integrity test
GOX	gate oxide
GSMBE	gas source molecular beam epitaxy (MBE)
GUI	graphical user interface

H

HAZ	heat affected zone
HBT	heterojunction bipolar transistor
HCI	hot carrier injection
HCI	hydrochloric acid
HDP	high density plasma
HEMT	high electron mobility transistor
HeNe	helium/neon laser
HEPA	high efficiency particulate Attenuation filter
HF	hydrofluoric acid
Hg	mercury
HiPOx	high pressure oxidation
HLF	horizontal laminar flow
H Line	exposure at 405 nm
HMCZ	horizontal magnetic-field-applied Czochralski method
HMDS	hexamethyldisilazane
HREM	high resolution electron microscopy
HRTEM	high resolution transmission electron microscopy
HV	high voltage; high vacuum

I

IBE	ion beam etch
IC	integrated circuit
ICP	inductive coupled plasma
ID	inside diameter
ILD	interlevel dielectrics
I Line	exposure at 365 nm
IMP	ion metal plasma
InP	indium phosphide
I/O	input/output
IPA	isopropyl alcohol
IR	infrared
ITP	implantation through polysilicon
IV	current voltage test

J

JFET	junction field effect transistor
JIT	just-in-time inventory; just-in-time manufacturing

K

K	potassium
KGD	known good die
Kilo (K)	thousand
KOH	potassium hydroxide

L

L/S	lines and spaces
LASER	light amplification by stimulated Emission of radiation
LCD	liquid crystal display
LCVD	laser enhanced chemical vapor deposition
LDD	lightly doped drain
LEC	liquid encapsulated Czochralski growth method
LED	light emitting diode
LEED	low energy electron diffraction
LFM	lateral force microscopy
LFMCZ	low flux magnetic-field-applied Czochralski method
L_g	gate length
LOCOS	local oxidation of silicon
LPCVD	low pressure chemical vapor deposition
LPE	liquid phase epitaxy
LRP	limited reaction processing
LSD	least significant digit
LSI	large scale integration

LSPE	lateral solid phase epitaxy
LTE	low temperature epitaxy
LTO	low temperature oxide
LTV	local thickness variation

M

Mb	megabit
MBE	molecular beam epitaxy
MCM	multi chip module
MCZ	magnetic-field-applied Czochralski method
MEMS	microelectromechanical system
MERIE	magnetically enhanced reactive ion etch
MESFET	metal-semiconductor field effect transistor
MFC	mass flow controller
MFM	magnetic force microscopy
MG	metallurgical grade; mechanical grade
MHz	megahertz
MICs	mobile ionic contaminants
Micro-FTIR	micro-Fourier transform infrared spectroscopy
Mil	one thousandth of an inch
MISFET	metal-insulator field effect transistor
MLM	multilevel metal
MLR	multilevel resist
mm	millimeter
MMIC	monolithic microwave integrated circuit
MMOS	memory metal-oxide-semiconductor device
MOCVD	metalorganic chemical vapor deposition
MODFET	modulation-doped field effect transistor
MOS	metal-oxide-semiconductor
MOSFET	metal-oxide-semiconductor field effect transistor
MOVPE	metalorganic vapor phase expitaxy
MPU	microprocessor unit
MQW	multiquantium well device
MSDS	material safety data sheet
MSI	medium scale integration
MST	manufacturing support trainer
mT	millitorr
MTBF	mean time between failure
MTF	mean time to failure; modulation transfer function

N

n	n-type dopant: neutron
n^-	n-type lightly doped
n+	n-type heavily doped
N	negative
N_2	nitrogen
NA	numerical aperture
NAA	neutron activation analysis
NaOH	sodium hydroxide
NC	normally closed; numerical control
nm	nanometer
NMOS	n-channel metal-oxide-semiconductor
NO	normally open
NPN	n-type/p-type/n-type transistor
NTRS	National Technology Roadmap for Semiconductors
NUV	near-ultraviolet

O

O_2	oxygen
OAI	off-axis illumination
OD	outside diameter
OISF	oxidation induced stacking faults
OPC	optical particle counter; optical proximity correction
OSHA	Occupational Safety and Health Administration

P

p	p-type dopant
p^-	p-type lightly doped
p+	p-type heavily doped
P	postive: phosphorous
p+	proton
P_{base}	base pressure

PAC	photoactive compound
PBA	polybuty acrylate
PBGA	plastic ball grid array
PC	personal computer; printed circuit
PCB	printed circuit board; plug control bar
PCM	portable conformable mask
PDIP	plastic dual inline package
PE	plasma etch
PEB	post-exposure bake
PECVD	plasma-enhanced chemical vapor deposition
PEL	permissible exposure limit
PGA	pin grid array
pH	density of hydrogen ions
PH_3	phosphine
PHCVD	photon-enhanced chemical vapor deposition
PID	proportional-integral-derivative feedback
PL	photolithography; projection lens; photoluminescence
PM	preventative maintenance
PMD	poly-metal interlevel dielectric
PMOS	p-channel metal-oxide-semiconductor
P-N	p-type/n-type diode junction
PNP	p-type/n-type/p-type transistor
POCL	phosphoxychlorine
Poly	polycrystalline silicon
POU	point of use
PPB	parts per billion
ppm	parts per million
PPMA	parts per million atomic
PPT	parts per trillion
PTFE	polytetrafluorethylene
PR	photoresist
PROM	programmable read-only memory
PS	power supply
PSG	phosphosilicate glass
psi	pounds per square inch
PSM	phase shift mask
Pt	platinum
PUPS	programmable ultrasonic power supply
PVA	polyvinylacetate
PVD	physical vapor deposition
PWP	particles per wafer per pass

Q

QA	quality assurance
Q_{bd}	charge to breakdown
QC	quality control
QDR	quick dump rinse
QFP	quad flat package
Q&R	quality and reliability

R

RAM	random-access memory
R&D	research and development
RBS	Rutherford backscattering spectroscopy
RCA clean	cleaning solution developed by the RCA company
RF	radio frequency
RIBE	reactive ion beam etch
RIE	reactive ion etch
RMS	root mean square
R&M	repair and maintenance
ROM	read-only memory
RTA	rapid thermal anneal
RTN	rapid thermal nitridation
RTO	rapid thermal oxidation
RTP	rapid thermal processing
RTV	room temperature vulcanized

S

S&R	step and repeat
SA	self-aligned
SAM	scanning acoustic microscopy
SAW	surface acoustic wave
Sb	antimony
SBGA	super ball grid array
SC	semiconductor
SC1	standard cleanup #1 (a version of the RCA cleanup)
SC2	standard cleanup #2 (a version of the RCA cleanup)
SCALPEL	scattering with angular limitation projection electron-beam lithography

SCCM	standard cubic centimeters per minute
SCM	scanning capacitance microscopy
SD	source-drain
SE	secondary electrons
SEBT	selective epitaxy base transistor
SEEW	selective epitaxial emitter-window
SEG	selective epitaxial growth
SEM	scanning electron microscope
SEMI	Semiconductor Equipment & Materials International
SEU	single event upset
Si	silicon
SI	semi-insulating
Si_3N_4	silicon nitride
SIA	Semiconductor Industry Association
SiC	silicon carbide
SIMION	simulation of ion trajectories
Silox	silicon dioxide used as a protective coating
SIMS	secondary ion mass spectroscopy
SiO_2	silicon dioxide
SI unit	international system of units
SIPOS	semi-insulating polysilicon
SLM	standard liter per minute; single-level metal
SOG	spin-on glass
SOI	silicon-on-insulator
SOP	small outline package
SOS	silicon on sapphire
SPC	statistical process control
SPICE	simulated programming with integrated circuit emphasis
SPM	scanning probe microscopy
SRM	site risk management
SQC	statistical quality control
SRAM	static random access memory
SRD	spin rinse drier
SRP	spreading resistance profiling
SSI	small scale integration
SSOP	shrink small outline package
STEM	scanning transmission electron microscopy
STI	shallow trench isolation
STM	scanning tunneling microscope
STP	standard temperature and pressure

T

Ta	tantalum
TAB	tape automated bonding
$TaSi_2$	tantalum silicide
TARC	top antireflective coating
TC	thermocouple
TCA	trichloroethene
TCAD	technolgy computer-aided design
TCE	trichloroethylene or trichloroethene Or thermal coefficient of expansion
T/C	thermocompression bonding
TCP	tape carrier package
TCP™	Transformer Coupled Plasma™
TCS	trichlorosilane
TDDB	time-dependent dielectric breakdown
TEM	transmission electron microscopy
TEOS	tetraethylorthosilicate
TFT	thin film transistor
Ti	titanium
TiN	titanium nitride
$TiSi_2$	titanium silicide
TIR	total indicator reading
TLV	threshold limit value
TMAH	tetramethyl ammonium hydroxide
TMB	trimethylborate
TMP (-ite)	trimethylphosphite
TMP (-ate)	trimethylphosphate
TOC	total oxidizable carbon
TOF	time of flight
TQC	total quality controlTQFP thin quad flat package
T/S	thermosonic bonding
TTL	through-the-lens or transistor-transistor logic
TTV	total thickness variation
TW	thermal-ware

U

UHV	ultra high vacuum
ULPA	ultra low penetration air filter

ULSI	ultra large scale integration
UPS	ultraviolet photoelectron Spectroscopy
U/S	ultrasonic bonding
UV	ultraviolet light
UVOC	ultraviolet ozone cleaning

V

V_{cc}	voltage source
V_{dd}	voltage source
VLF	vertical laminar flow
VLSI	very large scale integration
VMCZ	vertical magnetic-field –applied Czochralski method
VPE	vapor phase epitaxy
V_t	threshold voltage

W

W	tungsten
WAT	wafer acceptance test
WIWNU	within wafer nonuniformity
WIP	wafers in process; work in process
WLBI	wafer level burn-in
WLR	wafer level reliability
WPH	wafers per hour
WSI	wafer scale integration
WSi_2	tungsten silicide
WSM	wafer starts per month

X

XPS	x-ray photoelectron spectroscopy
XRD	x-ray diffraction
XRF	x-ray fluorescence
XRT	x-ray topography
Xsc	scattering cross-section

Y

YR	yield ramp

Z

Z	impedance