

# SIA PFAS Consortium

## Glossary of Terms

Terms	Definition
3D	three dimensional
5G/6G	Fifth- and sixth-generation cellular technology for wireless internet connections and communications.
ABT	manufacturing equipment abatement
ACGIH	American Conference of Governmental Industrial Hygienists
AI	artificial intelligence
AIX	anion exchange
ALD	atomic layer deposition
Aluminum etch	An aqueous mixture that includes phosphoric acid, nitric acid and acetic acid.
AMHS	automated material handling system
ANSI	American National Standards Institute
Anti-EBO	anti-epoxy bleedout
Antireflective coatings	Top- or bottom-surface coatings used to reduce light reflection at surface interfaces to better control line width in photolithography.
APM	A mixture of ammonium hydroxide (28 wt %), hydrogen peroxide (30 wt %) and water, also known as SC1.
Aqueous-based	A mixture in which water is the solvent.
ARC	anti-reflective coating
ArF	argon fluoride
Article(s)	<p>An object or objects made from one or more substances and mixtures given a special shape, surface or design during production that determines its function to a greater degree than its chemical composition, whether on its own or in an assembly with other articles, substances and mixtures.</p> <p>Also, materials used in the construction of semiconductor processing equipment, support equipment, facilities equipment, and other purchased or produced items containing PFAS.</p>
Assembly, test and packaging	The processing steps necessary to test and attach individual semiconductor devices into chip packages that can then be used in electronic devices.
ASTM	American Society for Testing and Materials
ATP	assembly, test and packaging
ATPS	assembly, test, packaging and substrate
AWN	acid waste neutralization
Back end of line	Processing to create the interconnect wiring for a device.
BARC	bottom anti-reflective coating
Barrier layers	Film between the silicide and metallization layers in an interconnect.
BCD	bulk chemical delivery
BEOL	back end of line

<b>Terms</b>	<b>Definition</b>
Bespoke parts	Parts or articles that are made to order or custom fabricated.
BGA	ball grid array
BHF	buffered hydrofluoric acid etch
Bioaccumulation	A gradual accumulation of substances or chemicals in an organism.
BMS/QA	business management system/quality assurance
BOE	buffered oxide etch
BOM	bill of materials
BP	boiling point
Buffered oxide etch	An aqueous mixture of hydrofluoric acid and ammonium fluoride.
C4	Perfluorinated and polyfluorinated alkyl substances with a chain length of four carbons. C4 can sometimes refer to controlled collapse chip connect, the steps in semiconductor manufacturing between front-end fab manufacturing and assembly test and packaging steps.
CAGR	compound annual growth rate
CARs	chemically amplified resists
CBI	confidential business information
C-C backbone	All organic compounds are made up of carbon-carbon bonds, creating a carbon skeleton or backbone in the compounds.
CD-SEM	critical dimension-scanning electron microscope
C-F bond	carbon-fluorine bond
CFCs	chlorofluorocarbons
Chalcogen	Any element in group 16 of the periodic table such as oxygen, polonium, sulfur, selenium or tellurium; the latter three are typical chalcogens in a dichalcogenide.
Chamber clean	A process in chemical vapor deposition that removes deposition residues from chamber walls and other interior surfaces.
Chemical mechanical planarization slurries	Abrasive and corrosive chemical slurry (commonly a colloid) used to remove material and even out irregular topography, making the wafer flat or planar.
Chemical mechanical polishing	A process that smooths and polishes the surface of a wafer to extreme levels of precision, used during multiple steps of wafer manufacturing.
Chemical vapor deposition	Microfabrication processes used to deposit thin films of materials in various forms, including monocrystalline, polycrystalline, amorphous and epitaxial.
Chip	The common name for an integrated circuit.
Clean room	An engineered space that maintains a very low concentration of airborne particulates.
CMC	critical micellar concentration
CMP	chemical-mechanical planarization
CMR	carcinogenic, mutagenic and toxic for reproduction substances
CNT	carbon nanotube
C-O Bond	carbon-oxygen bond
Coax	The abbreviated term for a coaxial cable.

<b>Terms</b>	<b>Definition</b>
Component	An identifiable part that a manufacturer of SMRE or facilities equipment has purchased to produce a more complex assembly.
CTE	coefficient of thermal expansion
CVD	chemical vapor deposition
CZ	The Czochralski crystal growth process (for making silicon ingot that silicon wafers are then cut from).
D4, D5, D6 ring	Cyclosiloxanes containing four, five and six silicon atoms in the ring, respectively.
Deep ultraviolet	The wavelength of light (249 nm and 193 nm) used to produce fine features on semiconductor devices.
Dense feature bias	A critical dimension swing resulting from a shifted resist depth of focus caused by a change in thickness of a lithography film stack as it coats over various pitches, critical dimensions and aspect ratios of substrate topography.
DEP	deposition equipment
Deposition	A semiconductor manufacturing step where thin films of materials are added in various forms to the surface of a wafer.
DETCH	dry etch equipment
Device	An electronic component that relies on the electronic properties of a semiconductor material (primarily silicon, germanium and gallium arsenide, as well as organic semiconductors) for its function.
Dichalcogenides	Any chalcogenide (a compound that contains a chalcogen and a more electropositive element) that contains two chalcogen atoms per molecule.
Die	A single instance of a particular end device produced simultaneously on a wafer; a wafer comprises hundreds of die, and a single die may contain millions of integrated circuits.
Die-attach adhesives	Adhesive used to mount or bond die to a support structure using an epoxy-based adhesive.
Die overcoat	Protective polymer coating applied to a bare die surface for small form packages.
Die passivation	The application of a PFAS anti-stiction material as a microcoating of micro-electromechanical system structures so that they become passive (less readily affected by the environment, while also reducing the surface work of adhesion to improve the surface energy properties necessary for actuation).
Dilute HF(DHF)	An aqueous mixture containing 0.1% to 0.5% hydrofluoric acid in water.
Drop-in replacement	An alternative substance that that performs in a functionally equivalent way and does not require the modification of existing manufacturing equipment.
Dry etch	The removal of a masked pattern of semiconductor material by exposing the material to a bombardment of ions (usually a plasma of reactive gases such as fluorocarbons or oxygen).
Dry vacuum pump system	A vacuum pump system that does not use a liquid sealing system, and is oil- and water-free.
DSC	die-side components
DUV	deep ultraviolet
E-beam	Electron-beam processing, also called electron irradiation.
EBI	electron irradiation

<b>Terms</b>	<b>Definition</b>
EC	European Commission
ECD	electrochemical deposition
ECHA	European Chemicals Agency
ECTFE	ethylene chlorotrifluoroethylene
EEA	European Economic Area
EEE	electrical and electronic equipment
EFEM	equipment front-end modules
EHS	environmental, health and safety
Electronegativity	The tendency of an atom such as fluorine to attract electrons in a molecule.
Electronic mold compounds	Cured resin used to protect semiconductor components from moisture and mechanical damage, and to serve as a mechanical structure.
Embedded barrier layers (photolithography)	A component of top-coat-free photoresists used for immersion lithography that contains an oligomeric or low-molecular-weight PFAS.
Encapsulant	A processing step in which a semiconductor chip is encased with a certain material to protect it from the external environment.
Environmental fate and transport	How chemicals released to the environment move in response to wind, rain and human activities.
EoL	end of life
EPDM	ethylene propylene diene monomer
Equipment	See SMRE.
ESIA	European Semiconductor Industry Association
Etching	The removal of unnecessary materials from a wafer's surface during the photolithography process so that only the design pattern remains.
ETFE	ethylene tetrafluoroethylene
EU	European Union
EUV	extreme ultraviolet
Extreme ultraviolet	The wavelength of light (13.5 nm) used to pattern the finest features required on foundation layers of advanced semiconductor devices.
Exposure latitude	The extent to which a light-sensitive material can be under- or overexposed and still achieve an acceptable result.
Fab	The abbreviated term for fabrication plant or fabricator, where semiconductors are manufactured on wafers (typically silicon wafers).
Facilities infrastructure	Systems within a factory that support manufacturing operations; for example, the storage, supply and disposal of gaseous and liquid chemicals, ultrapure water production, and exhaust abatement.
Far back end of the line	Processing that occurs after the fabrication of a semiconductor device in preparation for subsequent packaging.
FBEOL	far back end of the line
FC	flip chip
FCBGA	flip-chip ball grid array
FCCSP	flip-chip chip-scale package
FCLGA	flip-chip land grid array

<b>Terms</b>	<b>Definition</b>
FEOL	front end of line
FEP	fluorinated ethylene propylene
FFU HEPA	fan filter unit high-efficiency particulate air
F-gas	Fluorinated gases, particularly those that are perfluorocarbons and hydrofluorocarbons and may be considered PFAS-containing materials.
F-HTF	fluorinated heat transfer fluid
Final resolution	The smallest mask feature size that a photoresist can pattern.
FinFET	A multigate metal-oxide semiconductor field-effect transistor.
FKM	The American Society of Testing and Materials' name for fluoroelastomers or fluoro rubber material.
Fluorine	A chemical element with the chemical symbol F and atomic number 9.
Fluorine gas/F <sub>2</sub>	A diatomic gas consisting of two fluorine atoms covalently bonded.
FFKM	The American Society of Testing and Materials' name for perfluoro elastomers or perfluoro rubber material, which typically contains higher levels of fluorinated materials compared to FKM.
Fluoroelastomer	Fluorocarbon-based synthetic rubbers; part of the fluoropolymers family.
Fluoropolymer	A distinct subset of fluorinated high-molecular weight polymers with fluorine atoms directly attached to their carbon-only backbone.
FM	Factory Mutual
Focus window	A range of focus values for which a photoresist simultaneously meets linewidth, wall angle, absence of residues and top retention criteria.
FOSB	front opening shipping box
FPD	flat panel display
Front end of line	The steps of semiconductor fabrication, from a blank wafer to a completed wafer that has not yet been separated into individual chips.
FOUP	front opening unified pods
f-TTF	fluorinated-tetrathiafulvalene
GAC	granular activated carbon
GaN	gallium nitride
Gas cluster ion beam	A technology for nano-scale modification of surfaces. The process can smooth a wide variety of surface material types to within an angstrom of roughness without subsurface damage, and is also used to chemically alter surfaces through infusion or deposition.
Gasket	Flat, circular seals (often manufactured with flexible materials, but sometimes designed with harder materials) that sit between two flat surfaces designed to prevent leakage.
GDP	gross domestic product
GHG	greenhouse gas
GHS	globally harmonized system
GWP	global warming potential
H <sub>2</sub> O	water
H <sub>2</sub> O <sub>2</sub>	hydrogen peroxide

Terms	Definition
H <sub>2</sub> SO <sub>4</sub>	sulfuric acid
H <sub>3</sub> PO <sub>4</sub>	phosphoric acid
HAR	high aspect ratio
HCl	hydrochloric acid
HDI	high-density interconnect
HDPE	high-density polyethylene
HEPA	high-efficiency particulate air
HF	hydrofluoric acid or hydrogen fluoride gas
HFC	hydrofluorocarbon
HFFR	halogen-free flame retardants
HFPO-DA	hexafluoropropylene oxide-dimer acid
High aspect ratio	Very tall and narrow device features such as dynamic random access memory capacitor cells; the higher the aspect ratio of a feature, the more challenging it is to create.
HNBR	hydrogenated nitrile butadiene rubber
HNO <sub>3</sub>	nitric acid
HPDE	high-density polyethylene
HPM	A mixture of hydrochloric acid and hydrogen peroxide, also known as SC2.
HTF	heat transfer fluid
HUPW	high ultra-pure water
HV	high voltage
HVM	high-volume manufacturing
IC	integrated circuit
IEEE	Institute of Electrical and Electronics Engineers
IH	industrial hygiene
IHS	integrated heat spreader
IMEC	Interuniversity Microelectronics Centre
Immersion topcoat	A thin film, containing PFAS, applied over the photoresist to prevent the leaching of resist components into the water of the immersion tool, and likewise, to prevent water from permeating into the resist.
IMP	implant equipment
Implantation	A low-temperature process by which the ions of one element are accelerated into a solid target, thereby changing the physical, chemical or electrical properties of the target.
Integrated circuit	Also known as a chip, microchip or semiconductor device; a set of electronic circuits on one small flat piece of semiconductor material, usually silicon, with large numbers of integrated, miniaturized transistors and other electronic components.
Ion implantation	A low-temperature process in which a beam of ions is created from a source material and implanted (or injected) into the surface of a patterned wafer substrate.

<b>Terms</b>	<b>Definition</b>
IP	intellectual property
IPA	isopropyl alcohol
IRDS	International Roadmap for Devices and Systems
ISO	International Organization for Standardization
ITRI	Industrial Technology Research Institute
ITRS	International Technology Roadmap for Semiconductors
KOH	potassium hydroxide
KrF	krypton fluoride
LAN	local area network
Land-side components	The bottom side of a controlled collapse chip connection (C4) package, on which the package is mounted to a printed circuit board.
Laser release layers	A thermoset polymer-based layer that enables the stress-free debonding of glass-carrier wafers using ultraviolet laser irradiation.
LGA	land-grid array
LITH	lithography equipment
Lithography/litho	Abbreviated terms for photolithography.
L-PFC	liquid perfluorocarbon
LSC	land-side components
MAC	multiple-alkylated cyclopentane
Mask/mask set	See photomask.
MEMS	micro-electromechanical systems
MET	metrology equipment
Metrology	Measuring the various dimensions or physical or chemical characteristics of a semiconductor integrated circuit on a wafer.
Micro-electromechanical system devices	The technology of microscopic devices incorporating both electronic and moving parts.
Micron	A unit of length equal to one-millionth of a meter.
Mold releases	Materials applied to molds (for example, of plastic parts) to create a nonstick barrier.
Mold release sprays	An aerosol that forms a layer or barrier between the mold and casting agent that facilitates demolding.
Moore's law	Gordon Moore's principle that the number of transistors incorporated in a chip will approximately double every 24 months.
MTBC	mean time between cleans
MW	molecular weight
NAND	A type of flash memory that is nonvolatile, and does not require any power to keep data in it.
Nanometer	A unit of length equal to one-billionth (short scale) of a meter.
NaOH	sodium hydroxide
NBR	nitrile butadiene rubber
NEC	National Electrical Code

<b>Terms</b>	<b>Definition</b>
NF	nanofiltration
NH <sub>4</sub> OH	ammonium hydroxide
NIOSH	National Institute for Occupational Safety and Health
nm	nanometer
Node	Each new generation process designated by its minimum feature size in nanometers or its transistor gate length.
NTRS	National Technology Roadmap for Semiconductors
O <sub>2</sub>	oxygen
O <sub>3</sub>	ozone
OECD	Organization for Economic Co-Operation and Development
OEM	original equipment manufacturer
OEL	occupational exposure limit
Oleophobic	A substance that repels oil or organics.
Optical proximity correction	A photolithography enhancement technique used to compensate for image distortion caused by light diffraction or process effects.
Organic-based	Chemicals or formulations where the principle constituents are carbon-containing molecules.
O-ring	A donut-shaped gasket that helps seal joints between separate parts and prevents the leakage of fluids and gases.
Outgassing	The release of a gas that was dissolved, trapped, frozen or absorbed in a material.
Package	Metal, plastic, glass or ceramic casing containing one or more discrete semiconductor devices or integrated circuits.
PAGs	photoacid generators
PAO	polyalphaolphins
PAS	polyalkyl substances
PBGA	plastic ball grid array
PBT	persistent bioaccumulative toxins
PBZ	personal breathing zone
PC	personal computer
PCB	printed circuit board
PCD	planar chemical delivery
PCTFE	polychlorotrifluoroethylene
PDMS	polydimethylsiloxane fluids
PE	polyethylene
PECVD	plasma-enhanced chemical vapor deposition
PEEK	polyether ether ketone
Pellicle	A thin, transparent membrane used to prevent the deposition of unwanted particles on a photomask.
Perfluorocarbon gases	Gases used in plasma etching, gas deposition and chamber cleaning.
PERR	post-etch residue remover



Terms	Definition
PFA	perfluoroalkoxy copolymer
PFA-CF	perfluoroalkoxy-carbon fiber-reinforced composite
PFAS	perfluoroalkyl and polyfluoroalkyl substances
PFC	perfluorocarbons
PFEPE	polyfluoroethyl propyl ether
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonic acid
PFPE	perfluoropolyether
PFSA	perfluorosulfonic acid
PGA	pin grid array
Photoacid generator	Molecules that generate a strong acid upon the absorption of light used in chemically amplified resists.
Photolithography	Techniques that use light to produce minutely patterned thin films of suitable materials over a substrate, such as a silicon wafer, to protect selected areas of it during subsequent etching, deposition or implantation operations. Typically, ultraviolet light is used to transfer a geometric design from an optical mask to a light-sensitive chemical (a photoresist) coated on the substrate. The photoresist either breaks down or hardens where it is exposed to light. Removing the softer parts of the coating with appropriate solvents then creates the patterned film.
Photomask	A glass substrate with a pattern of transparent and opaque regions used to selectively expose the photoresist used in the photolithography process.
Photoresists	A light-sensitive material used in photolithography to form a patterned coating on a surface.
Pin grid array	A means of connecting a semiconductor package to a circuit board using metal pins.
Piranha etch	A mixture of sulfuric acid and hydrogen peroxide used to clean organic residues off of substrates.
Plasma cleaning	The use of a plasma gas to remove particles, residues and films from a wafer surface before or after adjacent processes.
Plasma dry etch	The removal of a masked pattern of semiconductor material by exposing the material to a bombardment of ions (usually a plasma of reactive gases such as fluorocarbons or oxygen).
Polymer	A substance or material consisting of very large molecules called macromolecules, composed of many repeating subunits.
POU	point-of-use abatement
PP	polypropylene
ppb	parts per billion
PPE	personal protective equipment
ppm	parts per million
ppt	parts per trillion
Pre-clean	See season.
PTFE	polytetrafluoroethylene
Pulse dampeners	A device in a pumping system that reduces pulsation during a pump cycle.

<b>Terms</b>	<b>Definition</b>
Pump fluids and lubricants	Chemicals that prevent the generation of particles and offgassing (in a vacuum), while ensuring the smooth and precise functionality of fabrication and processing equipment.
PVC	polyvinylchloride
PVD	physical vapor deposition
PVDF	polyvinylidene fluoride
QFN	quad-flat no-lead package
QFP	quad-flat pack
R&D	research and development
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals
Registration, Evaluation, Authorization and Restriction of Chemicals	European Union Regulation 1907/2006.
RF	radio frequency
RFO	restrictive flow orifice
RO	reverse osmosis
Standard Clean 1/SC1	A mixture of ammonium hydroxide (28 wt %), hydrogen peroxide (30 wt %) and water, also known as APM.
Standard Clean 2/SC2	A mixture of hydrochloric acid and hydrogen peroxide, also known as HPM.
SDS	safety data sheet
Season	A step in dry-etch processing that conditions the tool chamber with plasma gases to reduce chamber wall contamination or defects to production wafers.
SEM	scanning electron microscope
SEMI	Semiconductor Equipment and Materials International
Semiconductor Equipment and Materials International	A global industry trade association for the semiconductor and electronics supply chain.
SFE	semiconductor facility equipment
Si <sub>3</sub> N <sub>4</sub>	silicon nitride
SIA	Semiconductor Industry Association
SiARC	silicon anti-reflective coating
SiC	silicon carbide
Siloxanes	A functional group in organosilicon chemistry with the Si-O-Si linkage.
SiO <sub>2</sub>	silicon oxide
SMD	surface-mount device
SMIF	standard mechanical interface
SMRE	semiconductor manufacturing and related equipment
SMT	surface modification treatment
SOIC	small-outline integrated circuit
SOP	small-outline package

<b>Terms</b>	<b>Definition</b>
Spin-on barriers	Layers applied by spin casting that separate lithographic elements from each other; for example, spin-on topcoats in immersion lithography that separate photoresists and the immersion liquid.
Spin-on low-K dielectrics	A material with a small relative dielectric constant ( $\kappa$ , kappa) relative to silicon dioxide that is deposited on the surface of a wafer spinning on a rotating vacuum chuck.
Sputtering	Microscopic particles of a solid material ejected from its surface after the material is itself bombarded by energetic particles of a plasma or gas.
SRC	Semiconductor Research Corp.
SS	stainless steel
Substrate (packaging)	Supporting material upon which or within which the elements of a semiconductor device are fabricated or attached.
Surfactants	Chemical compounds that decrease the surface tension or interfacial tension between two liquids, a liquid and a gas, or a liquid and a solid.
SUS	steel uses stainless
SVHC	substance of very high concern
TAG	thermal acid generator
TARC	top anti-reflective coating
TCU	temperature control unit/thermal control unit
Temporary bonding/debonding	A process to offer temporary mechanical support for thin or to-be-thinned wafers in the advanced packaging and heterogeneous assembly of semiconductors.
TFE	tetrafluoroethylene
Thermal test method	A variety of techniques in which a property of a sample is continuously measured as the sample is programmed through a pre-determined temperature profile.
Thickener	A formulation component that increases the viscosity of the formulation.
TIM	thermal interface materials
TLV	threshold limit values
TMAH	tetramethylammonium hydroxide
TOC	total organic carbon
Tool	Another term for SMRE, often used to describe semiconductor manufacturing and related equipment.
Top retention	A lack of film thickness from the photoresist top.
Transistor	A semiconductor device used to amplify or switch electrical signals and power.
TSV	through-silicon via
TTF	thermal test fluids
UHP	ultra-high purity
ULPA	ultra-low particulate air
Underfills	An electrically insulating adhesive used to provide a stronger mechanical connection, provide a heat bridge, or prevent solder joint stress caused by differential heating of the chip and the rest of the system.
UPW	ultra-pure water

<b>Terms</b>	<b>Definition</b>
USA	United States of America
U.S. EPA	United States Environmental Protection Agency
USD	United States dollar
UV	ultraviolet
VAC	vacuum equipment
Vacuum dry etching	The removal a masked pattern of semiconductor material by exposing the material to a bombardment of ions (usually a plasma of reactive gases such as fluorocarbons).
Vacuum pump system	A pump and its associated appurtenances, such as tubing, piping and seals used to draw a vacuum.
van der Waals radius	A measure of the size of an atom that is not chemically (ionically or covalently) bound.
VF <sub>2</sub>	vinylidene fluoride
VMB	valve manifold box
VMQ	vinyl methyl silicone
VOC	volatile organic compound
vPvB	very persistent very bioaccumulative
VTM	vacuum transfer module
Wafer	A thin, round slice of a semiconductor (usually crystalline silicon) used for the fabrication of integrated circuits.
Wall angle	The angle formed by a photoresist sidewall and a substrate.
WCLN	wet cleaning
WEEE	waste electrical and electronic equipment
Wet chemistry	Liquid substances used in processes such as wet etching, cleaning, chemical-mechanical planarization, surface modification treatments and other liquid applications in chip manufacturing.
WETCH	wet etch equipment
WLP	wafer-level packaging
WSC	World Semiconductor Council
WSTS	World Semiconductor Trade Statistics
WTE	waste to energy