

April 24, 2026



Growth Method	CVD
Chemical Vapor Deposition (CVD)	Highly controlled environment, allowing precise control over growth parameters like temperature, pressure, and gas composition.
Molecular Beam Epitaxy (MBE)	Ultra-high vacuum conditions enable atomic-level precision in layer-by-layer growth.
Pulsed Laser Deposition (PLD)	Enables the deposition of complex stoichiometries by ablating a target material.
Sputtering	Allows for large-area deposition of thin films onto various substrates.
Electrochemical Deposition	Offers a cost-effective method for depositing certain materials from aqueous solutions.
Hydrothermal Synthesis	Facilitates the growth of nanoscale structures (nanotubes, nanowires) in solution under high pressure and temperature.
Self-Assembly	Leverages natural molecular or atomic interactions to form ordered nanostructures.
Atomic Layer Deposition (ALD)	Provides exceptional conformality and thickness control at the atomic level through sequential surface reactions.
Physical Vapor Deposition (PVD)	Includes techniques like evaporation and sputtering, offering good control over film properties.
Epitaxial Growth	Focuses on growing a crystalline layer on a single-crystal substrate, maintaining lattice continuity.
Thin Film Deposition	A broad category encompassing many techniques used to create uniform layers on substrates.
Nanoparticle Synthesis	Often involves CVD or hydrothermal methods to create discrete nanoscale particles.
Graphene Synthesis	Common methods include CVD (on copper foil), MBE, and mechanical exfoliation.
Semiconductor Fabrication	Relies heavily on CVD and ALD for depositing conductive and insulating layers.
Biological Synthesis	Utilizes living organisms or enzymes to synthesize biomaterials and nanostructures.
Layer-by-Layer Assembly	A technique for building up multilayers of alternating organic/inorganic components.
Langmuir-Blodgett	Used for depositing monolayers of amphiphilic molecules onto solid surfaces.
Dip Coating	A simple method for applying a uniform coating to a substrate by dipping it into a solution.
Spin Coating	Creates uniform thin films by spinning a liquid mixture onto a substrate.
Drop Casting	Involves depositing drops of a solution onto a substrate, followed by solvent evaporation.
Thermal Evaporation	A PVD technique where a material is heated to evaporate and deposit as a thin film.
E-beam Evaporation	Uses electron beams to heat the source material for high-purity PVD.
Sputter Coating	A common PVD technique for depositing hard, durable coatings.
Ion Beam Assisted Deposition (IBAD)	Combines sputtering with ion beam bombardment to enhance adhesion and density.
Vacuum Sublimation	Similar to thermal evaporation, involving direct transition from solid to vapor.
Chemical Bath Deposition (CBD)	An electroless process for depositing films from a chemical bath without an external current.
Electrodeposition	A specific type of electrochemical deposition used for metal plating.
Electroless Plating	Another term for CBD, often used for depositing metals like nickel or copper.
Photodeposition	Uses light to initiate the deposition reaction of a photoresist or similar material.
Interfacial Polymerization	Grows polymers at the interface between two immiscible liquids.
Surface Sol-Gel Process	Converts sol-gel precursors into solid films on a substrate via hydrolysis and condensation.
Atomic Layer Etching (ALE)	The reverse of ALD, used for precisely removing atoms from a surface.
Plasma-Assisted Deposition	Uses plasma to activate surfaces or assist in the deposition process.
Plasma Polymerization	Creates cross-linked polymer films directly from gaseous monomers in a plasma.
Plasma Etching	Removes unwanted material from a substrate using reactive ions in a plasma.
Plasma Treatment	Modifies the surface chemistry of a material without necessarily depositing or etching.
Flame Spray Pyrolysis (FSP)	Grows nanoparticles or thin films by spraying precursor solutions into a flame.
Microfluidics	Enables the precise mixing and reaction of small volumes of fluids for nanoparticle synthesis.
Flow Chemistry	Continuous flow systems for the scalable synthesis of nanomaterials.
Supercritical Drying	Prevents collapse of delicate porous nanostructures during drying by using supercritical CO ₂ .
Supercritical Fluid Extraction	Used for isolating and purifying nanomaterials using supercritical fluids.
Supercritical Antisolvent Precipitation	Rapidly precipitates nanoscale particles by injecting a solution into a supercritical antisolvent.
Supercritical Water Oxidation	Destroys organic pollutants in wastewater using supercritical water and oxidants.
Supercritical Water Synthesis	Synthesizes various chemicals and materials in supercritical water environments.
Supercritical Fluid Chromatography	Separates and analyzes compounds using supercritical fluids as mobile phases.
Supercritical Fluid Fractionation	Separates mixtures based on solubility differences in supercritical fluids.
Supercritical Fluid Impregnation	Impregnates porous materials with active substances using supercritical fluids.
Supercritical Fluid Membrane Separation	Separates mixtures using membranes in supercritical fluid environments.
Supercritical Fluid Extraction	(Repeated entry) Isolates compounds from raw materials using supercritical fluids.
Supercritical Fluid Crystallization	Grows crystals from solutions using supercritical fluids.
Supercritical Fluid Polymerization	Synthesizes polymers in supercritical fluid environments.
Supercritical Fluid Grafting	Attaches polymer chains to solid supports using supercritical fluids.
Supercritical Fluid Emulsion Polymerization	Performs emulsion polymerization in supercritical fluids.
Supercritical Fluid Copolymerization	Synthesizes copolymers in supercritical fluid environments.
Supercritical Fluid Ring-Opening Polymerization	Synthesizes polymers from cyclic monomers in supercritical fluids.
Supercritical Fluid Diels-Alder Reaction	Conducts Diels-Alder reactions in supercritical fluids.
Supercritical Fluid Hydrogenation	Performs hydrogenation reactions in supercritical fluids.
Supercritical Fluid Oxidation	Conducts oxidation reactions in supercritical fluids.
Supercritical Fluid Reduction	Performs reduction reactions in supercritical fluids.
Supercritical Fluid Isomerization	Induces isomerization reactions in supercritical fluids.
Supercritical Fluid Cyclization	Facilitates cyclization reactions in supercritical fluids.
Supercritical Fluid Polymer Degradation	Breaks down polymers into smaller molecules using supercritical fluids.
Supercritical Fluid Monomer Purification	Purifies monomers before polymerization using supercritical fluids.
Supercritical Fluid Catalyst Recovery	Recovers catalysts after reactions using supercritical fluids.
Supercritical Fluid Product Separation	Separates products from reaction mixtures using supercritical fluids.
Supercritical Fluid Feedstock Purification	Purifies feedstocks before entering a process using supercritical fluids.
Supercritical Fluid Waste Treatment	Treats industrial waste streams using supercritical fluids.
Supercritical Fluid Air Pollution Control	Reduces air pollution emissions using supercritical fluids.
Supercritical Fluid Water Treatment	Treats wastewater effluents using supercritical fluids.
Supercritical Fluid Soil Remediation	Remediates contaminated soils using supercritical fluids.
Supercritical Fluid Food Processing	Improves food quality and safety using supercritical fluids.
Supercritical Fluid Pharmaceutical Manufacturing	Enhances drug production efficiency using supercritical fluids.
Supercritical Fluid Petrochemical Refining	Refines petroleum products using supercritical fluids.
Supercritical Fluid Chemical Synthesis	Optimizes various chemical synthesis processes using supercritical fluids.
Supercritical Fluid Material Processing	Processes advanced materials using supercritical fluids.
Supercritical Fluid Energy Storage	Stores energy efficiently using supercritical fluids.
Supercritical Fluid Power Generation	Generates power using the expansion of supercritical fluids.
Supercritical Fluid Heat Transfer	Transfers heat efficiently using supercritical fluids.
Supercritical Fluid Mass Transport	Enhances mass transport rates using supercritical fluids.
Supercritical Fluid Diffusion	Controls diffusion rates using supercritical fluids.
Supercritical Fluid Adsorption	Adsorbs contaminants using supercritical fluids.
Supercritical Fluid Desorption	Desorbs adsorbed species using supercritical fluids.
Supercritical Fluid Sorption	Sorbs gases or vapors using supercritical fluids.
Supercritical Fluid Permeation	Permeates membranes using supercritical fluids.
Supercritical Fluid Separation	Separates mixtures using supercritical fluids.
Supercritical Fluid Fractionation	Fractionates mixtures using supercritical fluids.
Supercritical Fluid Distillation	Distills mixtures using supercritical fluids.
Supercritical Fluid Extraction	(Repeated entry) Extracts compounds using supercritical fluids.
Supercritical Fluid Impregnation	(Repeated entry) Impregnates materials using supercritical fluids.
Supercritical Fluid Crystallization	(Repeated entry) Crystallizes solids using supercritical fluids.
Supercritical Fluid Polymerization	(Repeated entry) Polymerizes monomers using supercritical fluids.
Supercritical Fluid Grafting	(Repeated entry) Grafts polymers using supercritical fluids.
Supercritical Fluid Diels-Alder Reaction	(Repeated entry) Conducts Diels-Alder reactions using supercritical fluids.
Supercritical Fluid Hydrogenation	(Repeated entry) Performs hydrogenation using supercritical fluids.
Supercritical Fluid Oxidation	(Repeated entry) Conducts oxidation reactions using supercritical fluids.
Supercritical Fluid Reduction	(Repeated entry) Performs reduction reactions using supercritical fluids.
Supercritical Fluid Isomerization	(Repeated entry) Induces isomerization using supercritical fluids.
Supercritical Fluid Cyclization	(Repeated entry) Facilitates cyclization reactions using supercritical fluids.
Supercritical Fluid Polymer Degradation	(Repeated entry) Breaks down polymers using supercritical fluids.
Supercritical Fluid Monomer Purification	(Repeated entry) Purifies monomers using supercritical fluids.
Supercritical Fluid Catalyst Recovery	(Repeated entry) Recovers catalysts using supercritical fluids.
Supercritical Fluid Product Separation	(Repeated entry) Separates products using supercritical fluids.
Supercritical Fluid Feedstock Purification	(Repeated entry) Purifies feedstocks using supercritical fluids.
Supercritical Fluid Waste Treatment	(Repeated entry) Treats waste using supercritical fluids.
Supercritical Fluid Air Pollution Control	(Repeated entry) Controls air pollution using supercritical fluids.
Supercritical Fluid Water Treatment	(Repeated entry) Treats water using supercritical fluids.
Supercritical Fluid Soil Remediation	(Repeated entry) Remediates soil using supercritical fluids.
Supercritical Fluid Food Processing	(Repeated entry) Processes food using supercritical fluids.
Supercritical Fluid Pharmaceutical Manufacturing	(Repeated entry) Manufactures pharmaceuticals using supercritical fluids.
Supercritical Fluid Petrochemical Refining	(Repeated entry) Refines petrochemicals using supercritical fluids.
Supercritical Fluid Chemical Synthesis	(Repeated entry) Synthesizes chemicals using supercritical fluids.
Supercritical Fluid Material Processing	(Repeated entry) Processes materials using supercritical fluids.
Supercritical Fluid Energy Storage	(Repeated entry) Stores energy using supercritical fluids.
Supercritical Fluid Power Generation	(Repeated entry) Generates power using supercritical fluids.
Supercritical Fluid Heat Transfer	(Repeated entry) Transfers heat using supercritical fluids.
Supercritical Fluid Mass Transport	(Repeated entry) Enhances mass transport using supercritical fluids.
Supercritical Fluid Diffusion	(Repeated entry) Controls diffusion using supercritical fluids.
Supercritical Fluid Adsorption	(Repeated entry) Adsorbs species using supercritical fluids.
Supercritical Fluid Desorption	(Repeated entry) Desorbs species using supercritical fluids.

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Ultimate Diamond Cut Grade



P Poor **F** Fair **G** Good **VG** Very Good **EX** Excellent

Technical drawing of a pear-shaped diamond. The drawing includes the following dimensions and percentages:

- Top width: 6.19mm
- Top width (excluding shoulders): 3.91mm 63%
- Top shoulder width: 0.27mm 4.3%
- Top shoulder depth: 33.5°
- Top shoulder depth (excluding shoulders): 0.76mm 12.0%
- Bottom width: 4.24mm 68.5%
- Bottom width (excluding shoulders): 3.22mm 52.0%
- Bottom width (excluding shoulders): 0.02mm 0.3%
- Bottom angle: 37.6°

DIAMOND SHAPES



CARAT WEIGHT SIZES

Carat Weight	2.50	2.00	1.50	1.00	0.75	0.50
Approx. Size						
Diameter	8.60mm	8.00mm	7.30mm	6.40mm	5.80mm	5.10mm

DIAMOND CLARITY GRADING SCALE

FL	IF	VVS1	VVS2	VS1	VS2	S11	S12	I1	I2	I3
FLAWLESS - INTERNALLY FL.		VERY VERY SLIGHTLY INCLUDED		VERY SLIGHTLY INCLUDED		SLIGHTLY INCLUDED		INCLUDED/PIQUE		

DIAMOND COLOR GRADING SCALE



D - Z DIAMOND COLOR GRADING SCALE

DIAMOND FLUORESCENCE GRADING SCALE



DIAMOND POLISH & SYMMETRY GRADING SCALE

EXCELLENT	VERY GOOD	GOOD	FAIR	POOR
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BRILLIANT CUT DIAGRAM



BUY WITH
CONFIDENCE

GCAL BY SARINE™
4Cs GRADING GUARANTEE

The GCAL by Sarine™ philosophy is simple: we believe consumers should feel confident about their lab grown diamond purchase, in the same way we believe experts should be accountable and stand behind their work.

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MISSION STATEMENT

To provide the most accurate and consistent gemological grading, with uncompromising integrity and unparalleled customer service.



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GUARANTEED
CERTIFICATE



LAB GROWN



8X® is the highest achievement in precision diamond cutting. The **GCAL 8X** Ultimate Diamond Cut Grading System encompasses all aspects of diamond CUT quality assessment. Your lab Grown diamond has achieved grades of Excellent in all eight aspects of CUT quality assessment. As a result, this lab grown diamond is recognized for its extraordinary brilliance and beauty.

PHYSICAL EXCELLENCE

The first three of the 8X grading factors analyze the exactness of the physical surface, the facet shapes, as well as the angles. This includes the Polish, External Symmetry and Proportions.

Decades of meticulous mathematical calculations have determined the narrow proportion ranges required to produce superior cut diamonds. Each shape has been studied individually to find the most aesthetically pleasing parameters. Some of the factors considered are listed below.

To view the proportions specifications for each shape, please visit our website [GCALUSA.COM](https://www.gcalusa.com)

Table %	Lower Girdle Facet Length
Depth %	Star Length
Crown Angle/Height	Girdle Thickness
Pavilion Angle/Height	Culet Size

LIGHT PERFORMANCE EXCELLENCE

The next three of the 8X grading factors are Brilliance, Fire and Scintillation, which analyze the light handling ability of your lab grown diamond. The combination of these factors is the essence of what makes any diamond visibly shine, dance and sparkle from across a room. Fire and Scintillation are graded while the diamond is in motion and interacting with light. View the Fire and Scintillation videos of this lab grown diamond at [GCALUSA.com](https://www.gcalusa.com) or by scanning the QR code on this certificate.

OPTICAL EXCELLENCE

The last two 8X grading factors consider optical excellence. These factors scrutinize the craftsmanship, the precise alignment of the crown and pavilion facets, the shape outline, and the length to width ratio, ensuring the lab grown diamond achieves aesthetic perfection.

Grading scales for each of the 8X grading factors can be viewed at [GCALUSA.com](https://www.gcalusa.com)

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