Gelest

Enabling Molecular Advances in Microelectronics & Optoelectronics

Organosilicon and Metal-Organic Precursors

Meeting the design challenges posed by systems and components for:

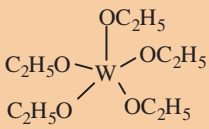
- *Metallization*
- *Dielectrics*
- *Lithography*
- *Encapsulation & Die Attach Adhesives*
- *OLEDs, LEDs, PLEDs, Phosphorescents, Electrochromics*

Gelest Microelectronics & Optoelectronics

Microelectronics

METALLIZATION

Gelest offers precursor materials for metallization applications derived from Group III & IV elements (Si, Al, Ti, Ta, W, In, Sb, Ge) used to create conductive coatings on silicon, germanium, silicon carbide, sapphire and plastic substrates. These precursors are suitable for various deposition techniques such as ALD, CVD, MOCVD and PECVD.



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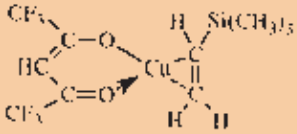

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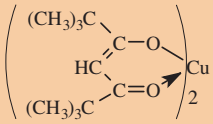


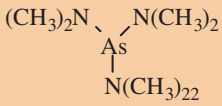
AKC262

$AlH_3 \cdot (CH_3)_2NCH_2CH_3$

OMAL005

$AlH_3 \cdot (CH_3)_3N$

OMAL008



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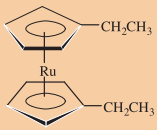
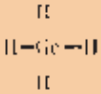


OMRU027

Strained Silicon – Silicon sources such as monochlorosilane, dichlorosilane, 1MS, 2MS, 3MS, 4MS and Germanium sources such as germane, t-butylgermane, germanium tetrachloride and other analogs are used in production of strained silicon using metal organic vapor phase epitaxy (MOVPE) to improve chip performance and lower energy consumption.

SiGe Precursors



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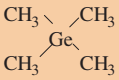

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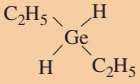

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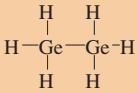

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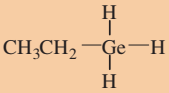

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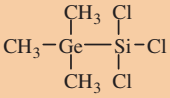

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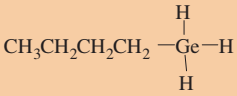

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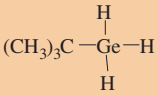


GEB1970

GeTe

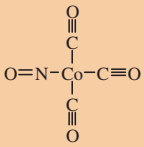
GEG5480

$GeSe_2$

GEG5350

Barrier Layers – Group IV material are used to reduce electromigration and other effects that Cu and Al have on Si and SiO_2 insulator properties and adhesion, while reducing metal corrosion.Typical deposition methods include PVD, CVD and MOCVD.

Cobalt



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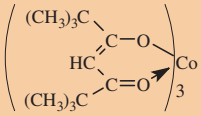
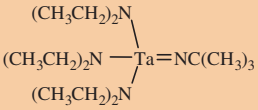


AKC240

Tantalum



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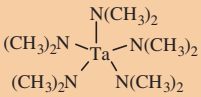

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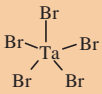
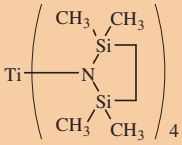


INTA070

Titanium



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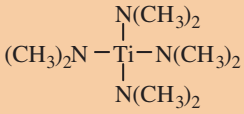

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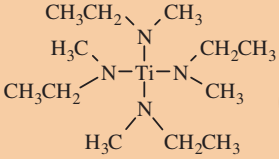


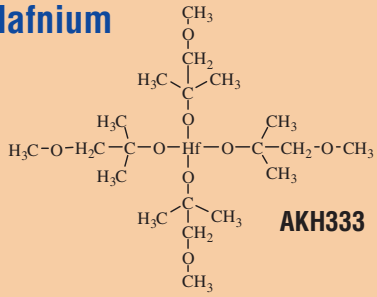
OMTI083

DIELECTRICS

Gelest has developed patented "chloride-free" chemical process technology to commercially produce Group IV materials for use as gate dielectrics and ILD (inter-layer dielectrics). Typical Group IV materials for gate dielectrics are compounds of Hf, Zr, and rare earths such as Ce, La, Pr. Typical ILD precursors are Si based. In addition, Si based materials will play a critical role in future generations of porous dielectric materials that will require improved adhesion, mechanical and thermal properties. Porous ULK dielectrics will require the use of CAPS.

Gate Dielectrics (High-K)

Hafnium



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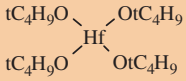

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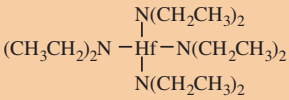

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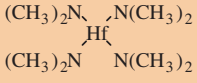

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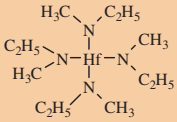

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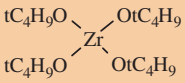
Zirconium



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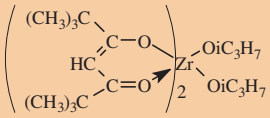

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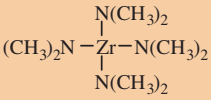
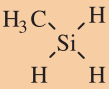


TDMAZ **OMZR080**

Inter-Layer Dielectrics (Low-K)

Thin Film



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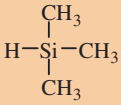

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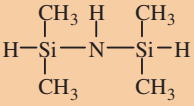

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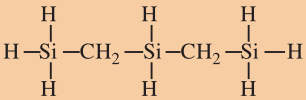
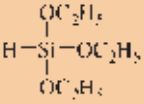
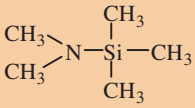


TSP **SIT8709.8**



SIT8185.0

Pore Sealing & CAPS



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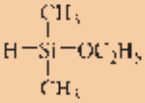

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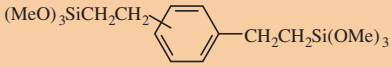
Porous Films & Porogens



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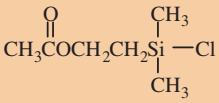

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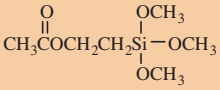

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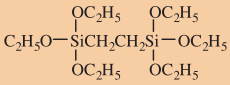

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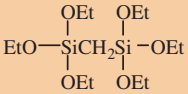

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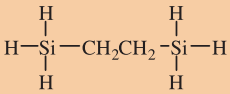
Etch-Stop Layers



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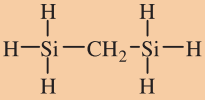

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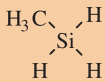

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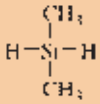

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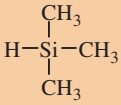

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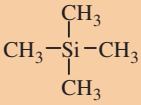

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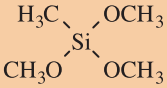
SiO_2 Source



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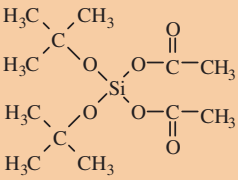

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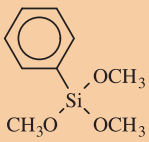

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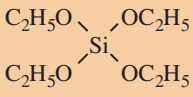
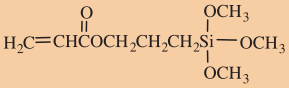


TEOS **SIT7110.2**

MEMS, NEMS, SAMs

SAMs (Self-Assembled Monolayers) – Group IV materials can be applied neat or in solution via conventional lithography techniques to form SAMs. SAM is a layer of amphiphilic molecules created by the chemisorption onto a metal oxide, precious metal surface, plastic or nanoparticle substrates, followed by the 2-dimensional alignment of hydrophobic groups to form a structures single monolayer. The surface can be selectively modified to achieve the desired anti-sticktion, mechanical and chemical properties for microelectromechanical systems (MEMS) and nanoelectromechanical systems (NEMS).

Metal Oxides



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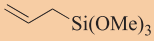

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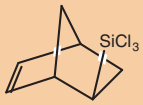

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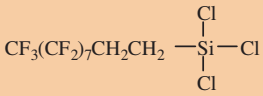

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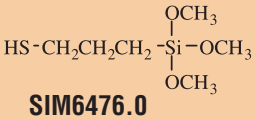

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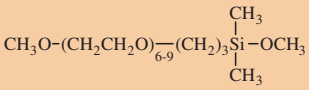

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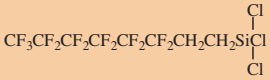
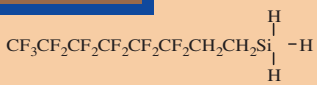


SIT8174.0

SIT8185.3

Gold, Silicon, Titanium Surfaces



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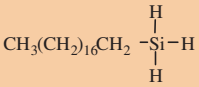

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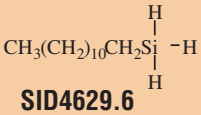


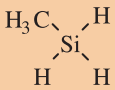
SID4629.6

EPITAXY

Volatile Carbosilanes and Higher Polysilanes – *the preeminent precursors for:*

- Amorphous Silicon
- Silicon Carbide films and buffer layers
- Carbon-doped (Tensile-Strained) Silicon
- SiCO:H films for low-k, barrier layers and etch-stop
- ALD promoted patterning and seed layers
- Silicon Carbonitride passivation

Carbosilanes



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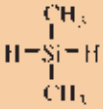

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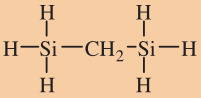

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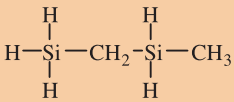

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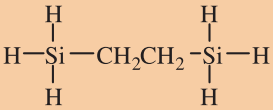

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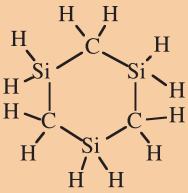

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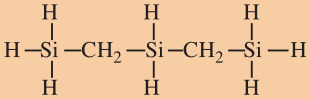

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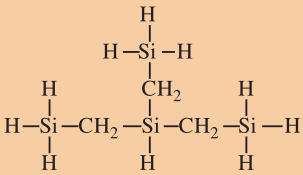
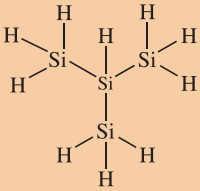


SIT8715.9

Volatile Higher Silanes



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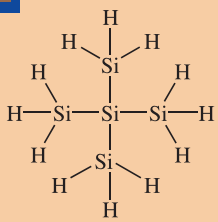

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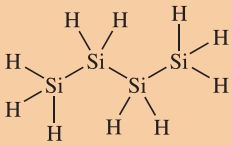

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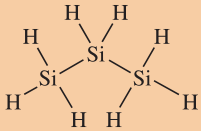


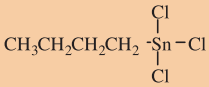
SIT8709.6

Optoelectronics

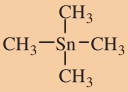
LEDs (Organic, Polymer, Phosphorescent)

Group IV materials are utilized to modify a variety of surfaces that include glass, metal oxides, plastics and nano-crystals. Plastic substrates are critical in the manufacture of flexible electronic displays. Gelest offers a multitude of materials for metallization via low temperature vapor deposition techniques such as CVD and ALD to yield conductive coatings and dielectric coatings for light emitting diodes to include OLEDs, PLEDs and Phosphorescent OLEDs. The ability to customize the refractive index of Group IV materials makes them ideal candidates for cladding fiber optic cables and planar wave-guides. Gelest offers an extensive range of materials for antireflective and refractive index coatings.

Conductive Coatings



SNB2000



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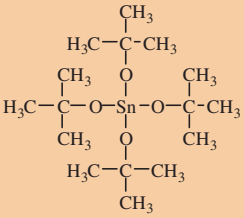
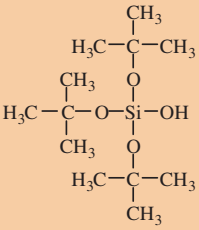


SNT7064

Dielectric Coatings



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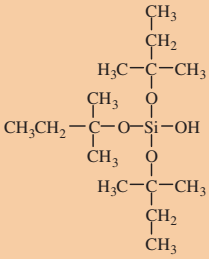

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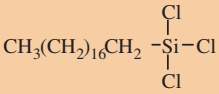

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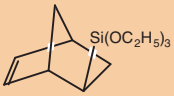

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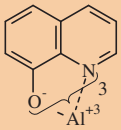
OLED Triplet Emitters



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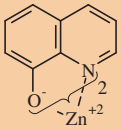

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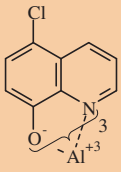

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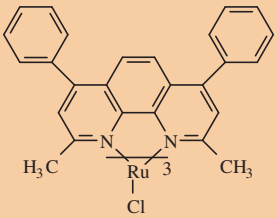
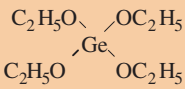


OMRU018

Optical Dopants



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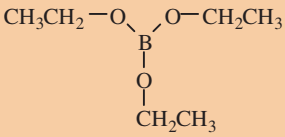

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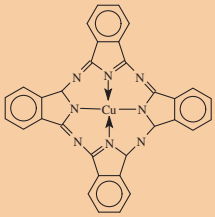
Chromophoric and Phosphorescent Materials



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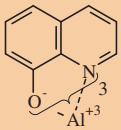

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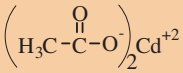

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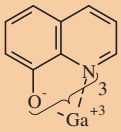

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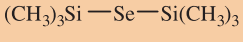

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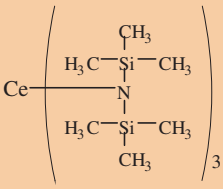

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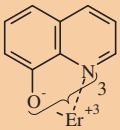

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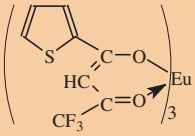

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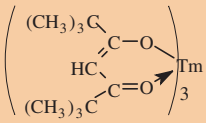

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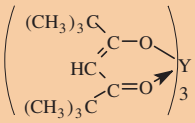

AKY932

Gelest, Inc.

Provides technical expertise in silicon and metal-organic materials for applications in Microelectronics & Optoelectronics. The core manufacturing technology of Gelest is silanes, silicones and metal-organics with the capability to handle flammable, corrosive and air sensitive liquids, gases and solids. Headquartered in Morrisville, PA, Gelest is recognized worldwide as an innovator, manufacturer and supplier of commercial and research quantities serving advanced technology markets through a materials science driven approach. The company provides focused technical development and application support for: semiconductors, optical materials, pharmaceutical synthesis, diagnostics and seperation science, and specialty polymeric materials.

For additional information on Gelest's Silicon and Metal-Organic based products or to inquire how we may assist in ***Enabling Your Technology***, please contact:

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