Gelest, Inc.

Provides technical expertise in silicon and metal-organic materials for applications in alternative energy. The core manufacturing technology of Gelest is silanes, silicones and metal-organics with the capability to handle flammable, corrosive and air sensitive materials. Headquartered in Morrisville, PA Gelest is recognized world-wide as an innovative manufacturer and supplier in commercial and research quantities, serving advanced technology markets through a material science driven approach.

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

www.gelest.com

© 2010 Gelest, Inc.
**Generation**

**Photovoltaic –**

**Band-gap Materials:**
- Silicon, gallium arsenide, indium phosphide, and tellurium

**Antireflection / All-angle Coatings:**
- Silicon nitride, silicon carbide, and silicon carbonitride

**Passivation Layers – coatings that prevent carrier recombination:**
- Silicon nitride, silicon carbide, and silicon carbonitride

**Protection Layers – coatings that prevent carrier recombination:**
- Silicon nitride, silicon carbide, and silicon carbonitride

**Transparent Conductive Oxide Coatings – TCOs:**
- SnO₂:F, ZnO:Al, SiO₂:

**Conductive Pastes:**
- Organic compatible silver inks used in conjunction with a high temperature curing solvent

**Surfaces:**
- Silicon nitride, silicon carbide, and silicon carbonitride

**Adhesive Promoters:**
- Siliglide™ 10 – low-friction, “glide” surfaces for glass, vitreous and metal substrates

**Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials:**
- Silica, alumina, aluminum oxide, functionalizing agents for porous silicon membranes

**Electrodes, Solid State Electrolytes, Proton-conducting solids –**
- Ceria (cerium oxides) by sol-gel and pyrolytic deposition

**Catalysts – Nanowires**
- Gelest OE41 – optically clear 1.41 flexible 2-component low temperature cure

**Catalysts – Nanowires**
- Gelest OE41 – optically clear 1.41 flexible 2-component low temperature cure

**Wind Turbine –**

**Turbine Lubricants for Low Temperature Environments**
- Silicahydrocarbons

**Silicate Esters**
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials

**Polymer Electrolyte Fuel Cells**
- Polymer Electrolyte Fuel Cells
- Polymer Electrolyte Fuel Cells
- Polymer Electrolyte Fuel Cells
- Polymer Electrolyte Fuel Cells

**Proton-conducting membranes –**
- Proton-conducting membranes –
- Proton-conducting membranes –
- Proton-conducting membranes –
- Proton-conducting membranes –

**Proton Mobility Facilitators**
- Proton Mobility Facilitators
- Proton Mobility Facilitators
- Proton Mobility Facilitators
- Proton Mobility Facilitators

**Turbine Lubricants for Low Temperature Environments**
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments

**Silane Polymers**
- Silane Polymers
- Silane Polymers
- Silane Polymers
- Silane Polymers

**Coupling Agents for Composites**
- Coupling Agents for Composites
- Coupling Agents for Composites
- Coupling Agents for Composites
- Coupling Agents for Composites

**Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials:**
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials

**Turbine Lubricants for Low Temperature Environments**
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments

**Silane Polymers**
- Silane Polymers
- Silane Polymers
- Silane Polymers
- Silane Polymers

**Coupling Agents for Composites**
- Coupling Agents for Composites
- Coupling Agents for Composites
- Coupling Agents for Composites
- Coupling Agents for Composites

**Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials:**
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials
- Monomers for High Temperature Proton Exchange Membranes Inorganic Scaffold Materials

**Turbine Lubricants for Low Temperature Environments**
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments
- Turbine Lubricants for Low Temperature Environments

**Silane Polymers**
- Silane Polymers
- Silane Polymers
- Silane Polymers
- Silane Polymers

**Coupling Agents for Composites**
- Coupling Agents for Composites
- Coupling Agents for Composites
- Coupling Agents for Composites
- Coupling Agents for Composites
**Photovoltaic**

**Band-gap Materials**
- Photovoltaic – Anti-Reflection / All-Angle Coatings:
  - Triple Junction GaAs Solar Cells / Metamorphic Multijunction Solar Cells. Germanium layers provide lattice match to quantum dots.
  - Gelest offers volatile silylated and non-volatile dithiocarbamate and carboxylate metal chalcogenide precursors.
  - CdTe/CdSe: Cadmium Telluride, Cadmium Selenide and CIGS (Copper Indium Gallium Selenide) precursors.
  - Gelest offers precursors for vapor phase and solution phase deposition of Groups II/III, II-VI, and IV (Si/Ge).

**Passivation Layers**
- Coatings that prevent carrier recombination:
  - Silicone, fluorinated silicone, and silicone on glass for concentration PV.

**Ant-Reflection / All-Angle Coatings**
- Designed primarily for high permittivity substrates such as germanium, gallium arsenide, and silicon.
  - Gelest offers precursors for high-index materials.

**Adhesive Promoters**
- Slipgilde™: low-friction, “glide” surfaces for glass, vitreous and metal substrates.
  - Ceramic™ SA: dielectric, thermally resistant SiO₂ coatings, deep UV curable.
  - Gelest OE series offers a range of materials that can be deposited without the vacuum requirements of sputtering techniques. Alternative material technologies that eliminate indium include zinc, antimony and selenium.

**Monomers for High Temperature Fuel Exchange Membranes**
- Inorganic scaffold materials.

**Fuel Cells – Proton Exchange Membrane FC**
- Electrodess, Solid State Electrolytes, Proton-conducting solids – Ceria (cerium oxides) by sol-gel and pyrolytic deposition.
- Conductive Pastes: Organic compatible silver salts are used in conjunction with silver powder to formulate front-side grid-like contacts.

**Silicon Encapsulants**
- Optically Clear: Low-index materials for optical guidance and planarization.

**Adhesive Promoters**
- Aquaphile™: water-wettable anti-fog coating for glass and ceramics.
Generation

**Photovoltaic –**

- **Band-gap Materials:** Gelest offers a wide-range of index materials based on silicon, germanium, anti-reflection / all-angle coatings.

- **Antireflection/Anti-Angle Coatings:** Gelest offers volatile silylated and non-volatile dithiocarbamate and carboxylate metal chalcogenide precursors. CdTe/CdSe: Cadmium Telluride, Cadmium Selenide and CIGS (Copper Indium Gallium Selenide) precursors are available for vapor phase, sol-gel and solution deposition applications ranging from large area arrays to nanoscale devices. Gelest offers volatile inorganic sulfate and non-volatile dichalcogenide/carbonyl metal chalcogenide precursors. Three function/catalysis Solar Cells/Membrane Electrolytic Solar Cells. Germany layers provide lattice mismatch for growth of GaAs on GaAs band gap photopolysiloxanes.

- **Passivation Layers – coatings that prevent carrier recombination:** Silicon nitride, silicon carbide, and silicon carbonitride perform a variety of roles on the topmost active layer stacks. Applications range from AR-coatings to Bragg mirrors and reflectors.

- **Silicone Encapsulants:** Siliglide™ 10 – low-friction, “glide” surfaces for glass, vitreous and metal substrates.

- **Silicon Oxide Coatings –** Gelest provides single-source precursors and precursors used in combination with secondary reactants such as ammonia or, with PECVD systems, nitrogen.

- **Antireflection/Anti-Angle Coatings:** Three function/catalysis Solar Cells/Membrane Electrolytic Solar Cells. Germany layers provide lattice mismatch for growth of GaAs on GaAs band gap photopolysiloxanes.

- **Optically Clear Silicone Encapsulants:** silicone air gaps for concentrator PV.

- **Lifetime Extension for Adhesion Promoters:** Monomer for High Temperature Proton Exchange Membranes: inorganic scaffold materials.


- **Wind Turbine –** Monomer for High Temperature Proton Exchange Membranes: inorganic scaffold materials.

- **Silica, alumina, aluminosilicates. Functionalizing agents for porous silica membranes.**

- **Polyurethane:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.

- **Polymer:** Polyurethane for wear resistant coatings.
Gelest, Inc.

Provides technical expertise in silicon and metal-organic materials for applications in alternative energy. The core manufacturing technology of Gelest is silanes, silicones and metal-organics with the capability to handle flammable, corrosive and air sensitive materials. Headquartered in Morrisville, PA Gelest is recognized worldwide as an innovative manufacturer and supplier in commercial and research quantities, serving advanced technology markets through a material science driven approach.

Capture & Storage

Meeting the Demands of Renewable Energy:
Generation, Capture and Storage

Organosilicon and Metal-Organic Materials

www.gelest.com

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

Geelst Inc.
11 East Steel Rd.
Morristown, PA 19067
Phone: 215-547-1010
Fax: 215-547-2484
info@gelest.com

© 2010 Gelest, Inc.

Meeting the Demands of Renewable Energy:
Generation, Capture and Storage

Organosilicon and Metal-Organic Materials

Ultracapacitors (electrochemical double layer capacitors) offer high power and energy density by utilizing high surface area porous carbon electrodes and ultra-thin dielectric distances. Broader voltage windows are anticipated with hydrogel or organic electrolytes.

Ionic Liquids provide broad voltage windows, high ionic conductivities and low vapor pressure.

Electroactive and Dielectric Materials - including membranes, electrodes and electrolytes
Water Immiscible Fluids - for electrolyte, heat transfer and lubricant applications
Structural Materials - including porous ceramics and advanced composites
Component Protection Materials - including passivation and encapsulation
Sol-Gel Coatings - for AR (anti-reflection) and abrasion resistance
Optical Materials - including band-gap and index materials
Gelest, Inc. Provides technical expertise in silicon and metal-organic materials for applications in alternative energy. The core manufacturing technology of Gelest is silanes, silicones and metal-organics with the capability to handle flammable, corrosive and air sensitive materials. Headquartered in Morrisville, PA Gelest is recognized worldwide as an innovative manufacturer and supplier in commercial and research quantities, serving advanced technology markets through a material science driven approach.

For additional information on Gelest’s Silicon and Metal-Organic based products or to enquire how we may assist in enabling your technology, please contact:

www.gelest.com

© 2010 Gelest, Inc.