Chemicals-1 ~Gas Products~

- **High-purity Gases/Solvents for Electronics**
  - SOLFINE™
- **Fluorine Chemicals**
- **Gases for Electronics**
- **High Corrosion Resistant Plating**
- **Clean-S™**
- **Inorganic Materials Design**
- **Specialty Gas Chemicals**
- **Surface Treatment**
- **Electrolysis**
- **Chlorine Hydrogen**
- **Industrial Gases**
- **ECOANN™**
- **Supercritical Carbon Dioxide**
- **Showa Denko Gas Products Co., Ltd.**
- **Mixed/Dispersion**
- **High-Temperature Heat Treatment**
- **Abatement System for Specialty gases**
- **Plastic Recycling**
High-purity gases/chemicals are used in the electronic industry for semiconductor manufacturing processes and FPD production processes.

Example products

Our technologies

Using purification technologies of “distillation, extraction, and filtration,” high-purity gases for semiconductors are manufactured.

To ensure the quality of the products, we own technologies including the following:

- Technology to treat and clean the inside of containers
- Sensitive analysis technology (LC, GC, ICP-MS)
- Plant construction and mass production technology

Plant to fill high-purity solvents

Sensitive analysis instrument (ICP-MS)
**Fluorine Chemicals**

**Example products**

Fluorine compounds are decomposed in plasma and react with materials such as silicon to form vapor materials.

Taking advantage of such characteristics, fluorine chemicals are used for dry etching in semiconductor manufacturing process and dry cleaning of the chambers.

**Our technologies**

Fluorine is an atom that can easily combine with any element. Utilizing such characteristics of fluorine, our fluorine technologies are applied to various products.

We own technologies including the following:

- Fluorine synthesis technology \(2HF \rightarrow F_2 + H_2\)
- Fluorine compound synthesis technology (gas phase)
- Fluorine compound synthesis technology (liquid phase)
- Sensitive analysis technologies (LC, GC, ICP-MS)
- Plant construction and mass production technology
**Example products**

We undertake the treatment of metal surfaces to prevent corrosion, such as cylinders, pipes, and valves. Such treatment is used for various applications, such as semiconductor manufacturing equipment components, vacuum pumps (molecular pumps, dry pumps), and plastic injection molding machines.

**Our technologies**

- **Surface treatment technology**

  We own the technology to improve corrosion resistance performance by forming nickel alloy films on SUS and aluminum using an electroless plating process.

  We have also developed our own passive state treatment technology to form NiF₂ films through the reaction of fluorine gas, thus achieving high corrosion and abrasion resistance.

![Diagram of NiF₂ film formation](image)
Supercritical Carbon Dioxide (CO₂)

Product Example

The use of supercritical CO₂ enables processes that conventionally needed organic solvents as well as processes not possible with organic solvents.

Supercritical CO₂ painting system

Our technologies

- Supercritical CO₂ application technology

Features of supercritical CO₂

(1) Dissolves organic substances well.
(2) Can be dissolved well in resins to reduce their viscosity.
(3) Can be discharged as a gas when the pressure is reduced to atmospheric pressure.

Applications of supercritical CO₂

(1) Cleaning/drying: Precision removal of even infinitesimal amounts of ingredients
(2) Dyeing/impregnation: Transferring effective ingredients to nano-sized spaces
(3) Painting: Alternative to a dilution solvent
(4) Creating a fine powder: Using the bubbling and cooling effects when sprayed
(5) Macromolecular polymerization: Reaction field with no residual solvent