

Abstract

Process Economics Program Report 234 Chemicals for Electronics Industry (March 2001)

Electronic chemicals and materials, or simply electronic chemicals, can be categorized into those for semiconductor and printed circuit board (PCB); but also include those for hybrid circuit and others in the broad sense. Semiconductor chemicals encompass semiconductor substrates, semiconductor processing chemicals, and semiconductor packaging materials. Semiconductor processing chemicals include bulk and specialty gases, wet chemicals, photoresists, thin film metals, and CMP slurries.

In 2000, the global electronic chemicals market was estimated to be \$23 billion. The market of bulk and specialty gases was \$1,875 million and that of wet chemicals was \$790 million. These two segments are the focus of this report. These chemicals range widely in volume usage and prices but with a common thread of high purity requirements.

This report first delineates the semiconductor fabrication process, from wafer processing to chip packaging, and discusses the industry status of electronic chemicals and the critical factors for successful participation in the market. This report then presents the applications, specifications and packaging, and production and purification technologies of bulk and specialty gases and wet chemicals used in wafer processing.

The classes and chemicals covered in this report are:

- Bulk gases, including nitrogen, oxygen, argon, helium, and hydrogen;
- Dopants gases, including arsine, phosphine, boron trichloride, boron trifluoride, and diborane;
- Etchant gases, including boron trichloride, chlorine, chlorine trifluoride, hydrogen chloride, hydrogen fluoride, nitrogen trifluoride, silicon tetrafluoride, sulfur hexafluoride, tetrafluoromethane, trifluoromethane, difluoromethane, fluoromethane, hexafluoroethane, pentafluoroethane, octafluoropropane, and octafluorocyclobutane;
- Chemical vapor deposition (CVD) chemicals, including silane, dichlorosilane, trichlorosilane, silicon tetrachloride, disilane, tetraethylorthosilicate, silicon tetrafluoride, methylsilane, germane, ammonia, nitrous oxide, and tungsten hexafluoride; and
- Wet chemicals, including acetic acid, acetone, ammonium fluoride, ammonium hydroxide, hydrochloric acid, hydrofluoric acid, hydrogen peroxide, isopropyl alcohol, nitric acid, phosphoric acid, and sulfuric acid.

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