

Ion Implant Gas Delivery Systems

Summary

Processes, devices, compositions and systems for delivering hazardous gases to ion implant tools via sub-atmospheric methods in the semiconductor industry are offered. Technology includes electrochemical arsine production as well as systems employing ionic liquids as the delivery medium for phosphine and 11B-enriched boron trifluoride.

Overview

In the semiconductor fabrication process, ion implant is a step utilizing hazardous gases such as arsine, phosphine and others to dope semiconductors such as silicon. Since the source gases for the ions desired are hazardous themselves, systems incorporating safety in handling and use of the source gases are highly valued. Customers typically do not purchase or desire high pressure cylinders of the gases utilized in this market, but would rather have a system which either produces the desired species on demand, or incorporates technology which greatly reduces the risk of a catastrophic release. In fact, In the United States, the National Fire Protection Association passed NFPA 318 -- 2002, Standard for Protection of Cleanrooms, which identifies sub-atmospheric gas delivery systems as "not being classified as compressed gases." The limitation on the number of ion implant pressurized gas cylinders installed in the fab is thus lifted. A leading insurance and property loss prevention research organization has published guidelines which suggest that sub-atmospheric toxic/flammable dopant gas sources should be used in place of high-pressure cylinder sources wherever process compatibility will allow. Examples of this type of sub-atmospheric gas delivery technology might be adsorption of the ion implantation gas onto solid or use of a solid precursor source for the source gas.

This offering incorporates both the onsite electrochemical production of arsine and the utilization of ionic liquids as complexing agent for the delivery of phosphine and 11BF₃ molecules.

Benefits:

- Both technologies are delivered to the customer in a form approved for use under current building and fire permits
- Technology allows for customer returns of spent cylinders to supplier for refill
- High available content of ion implant gas mass
- Two technologies allows for delivery of dominant gases used in ion implant market
- Technology and process developed well beyond prototype stage
- Detailed materials of construction and analytical methodology available
- Significant laboratory equipment for test and development available

U.S. Patent/Publication Number	Title
5,158,656	Method and Apparatus for the Electrolytic Preparation of Group IV and V Hydrides
6,080,297	Method and Apparatus for Constant Composition Delivery of Hydride Gases for Semiconductor Processing
20060231159A1	Dual-Flow Valve and Internal Processing Vessel Isolation System
7,172,646	Reactive Liquid Based Gas Storage and Delivery Systems
7,303,607	Liquid Media Containing Lewis Acidic Reactive Compounds for Storage and Delivery of Lewis Basic Gases
7,282,084	Liquid Media Containing Lewis Basic Reactive Compounds for Storage and Delivery of Lewis Acidic Gases
20060008392A1	Storage and Delivery Systems for Gases Held in Liquid Medium
20060060818A1	Ionic Liquid Based Mixtures for Gas Storage and Delivery
20060060817A1	Ionic Liquid Based Mixtures for Gas Storage and Delivery
20070240997	Method and Apparatus for Achieving Maximum Yield in the Electrolytic Preparation of Group IV and V Hydrides
20070279139	Contact Methods for Formation of Lewis Gas/Liquid Systems and Recovery of Lewis Gas Therefrom
20070217967	Wick Systems for Complexed Gas Technology



Examples of Arsine Generator Systems and Ionic Liquid Gas Delivery Systems and Packaging Materials

Also Offered:

A large amount of technical transfer assistance may be provided with a license. Operational and commercial know-how also exists. Significant manufacturing and analytical/QC/applications equipment is also offered. Cylinder and generator equipment, vendor contracts, O & M manuals, operations methods, raw materials specifications, safety/environmental reviews, 3rd party agency approvals, DOT packaging specifications and certifications are among the know-how offered as well.

Availability:

All serious inquiries for license will be considered.

For more information on licensing this technology contact:

Americas

Greg Wolf
Telephone: +1 610-481-4241
E-mail: wolfrg@airproducts.com

Europe / Middle East

Javier Sanchez
Telephone: +34 93 2900582
E-mail: sanchejf@airproducts.com

Asia

Xiaoping Gao
Telephone: +86 (21)38964410
E-mail: gaox@airproducts.com

tell me more
<http://www.airproducts.com>