ATONARP
ASTON™

Protecting the Environment from Harmful Emissions
Application Brief

Introduction

Semiconductor and thin-film solar processes use and create a variety of process gases and particulate material by-products that must be disposed of in a controlled manner. Disposal of many of the waste materials are controlled by environmental regulations, such as the U.S. NESHAP standards. The primary hazardous air pollutants that are controlled by this rule include, but are not limited to, five chemicals that comprise over 90 percent of the total hazardous air pollutants emissions:

- hydrochloric acid (HCl)
- hydrogen fluoride (HF)
- glycol ethers
- methanol
- and xylene

The U.S. EPA emission limit is 14.22 parts per million (PPM)by volume for combined air toxics process vents (organic and inorganic). Additional PFCs (perfluorinated carbon gases) and pyrophoric gases like silane SiH4 are monitored and destroyed.

The Problem

There are multiple challenges associated with abatement. At the simplest level, monitoring environment exhaust gases from the abatement system to ensure compliance with regulations requires high-sensitivity, real-time, in-situ metrology with PPM level accuracy. Further, optimizing abatement requires that waste process gases be measured for concentration of pollutants entering the abatement system, so that nitrogen dilution can be modulated along with abatement combustion gas consumption, to ensure effective and efficient destruction of pollutants. Natural gas (Methane) is typically used for high temperature thermal gas decomposition in the common burn-wash abatement systems and optimizing its use reduces abatement process cost and carbon dioxide emissions.

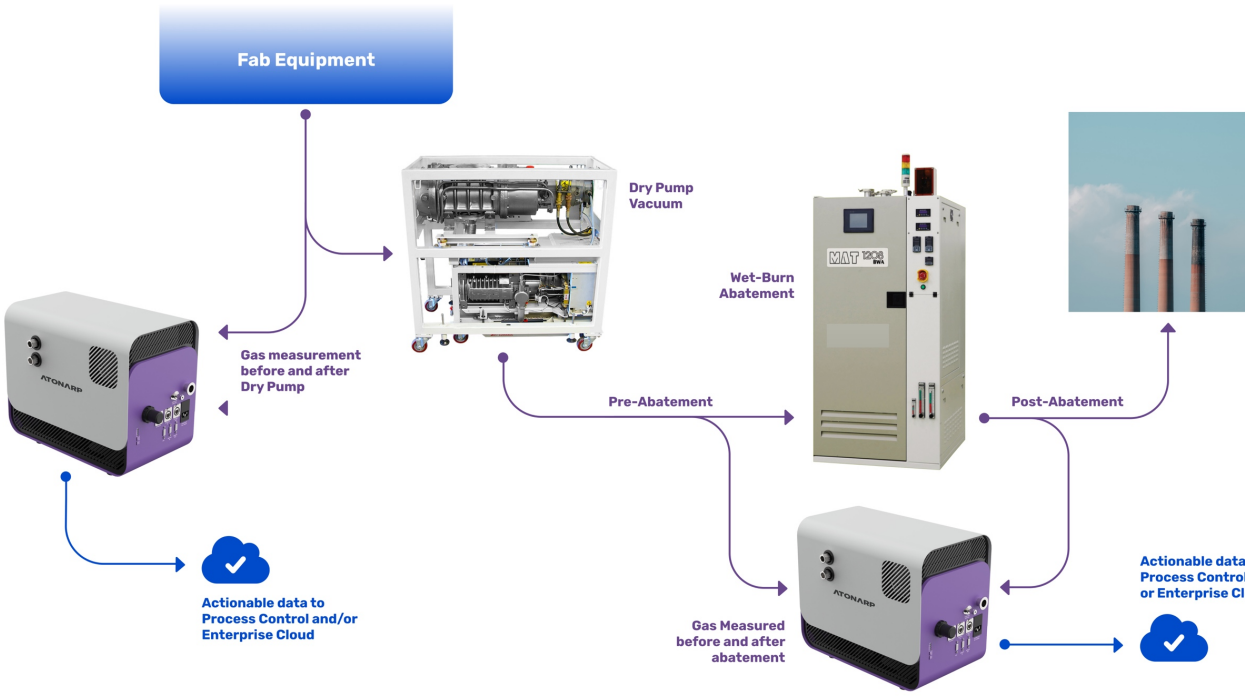
The Solution:
Data Driven Abatement

Many abatement systems are run 'open-loop', resulting in high levels of natural gas and nitrogen consumption. Further, analytical proof of abatement success is usually not monitored and recorded, leaving companies open to environmental regulation liabilities. Using Atonarp's Aston Plasma mass spectrometer allows for in-situ, optimized control of the abatement burn process based upon incoming waste gas concentrations and a data log of measured vented gasses to document environmental compliance.

Aston Plasma is uniquely capable of withstanding harsh PFC and acidic (e.g. HF & HCl) gases and can provide sensitivity down to PPB levels.

Summary

Fast, accurate, in-situ metrology allows for efficient abatement monitoring and exhaust gas environmental compliance. See the diagram below for a snapshot of the Aston Plasma-enabled abatement process flow.



Atonarp is advancing medical diagnostics, life sciences research, and industrial process control through next-generation digital molecular profiling. In-situ molecular profiling in advanced manufacturing means higher throughput, improved efficiency, and reduced waste. Real-time, quantitative diagnostic tests can improve outcomes and patient satisfaction at lower cost.

atonarp.com

info@atonarp.com