Potential COO Reduction for a Nitride Furnace POU Abatement Device

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While efforts in CVD emissions abatement focus mostly on improving designs to treat advanced processes, existing abatement devices are worth consideration, as well. Increasingly, budgetary restrictions and concerns about minimizing resource consumption motivate fabs to reuse or adapt existing abatement devices to meet current needs. Work to reduce water demand in point-of-use (POU) scrubbers is just one example of this (1). The following describes a case study in which the operating parameters for an abatement device are modified, and the resulting effects on emissions are measured. Specifically, the operating temperature of a burner coupled to a POU scrubber is reduced, while the combination's ability to treat nitride furnace effluent is monitored. The motivation for the project was a potential energy savings that could be realized by implementing the temperature change on numerous abatement devices.

Two recipes were run on a nitride furnace, while emissions data were collected using Fourier transform infrared (FTIR) spectroscopy at the inlet and exhaust ports of the tool's abatement device. A 10 m pathlength cell was used, with in-line filters placed upstream to protect the instrument from particulate contamination. Detected species were quantified using calibration curves based on spectral standards. Corrections were made for changing cell pressures as the experiment progressed.

One of the recipes evaluated showed promise for "room temperature abatement," while the second chemistry proved to be a poor candidate. Major detected species included water, CO_2, and HCl. The cost savings for lowering the temperature on a single abatement device results from reduced electricity use for heater operation, reduced HVAC load, and a potential cooling water reduction. Extended study would be recommended to ensure long-term effectiveness of abatement at reduced temperatures.

Figure 1: Picture of abatement device.

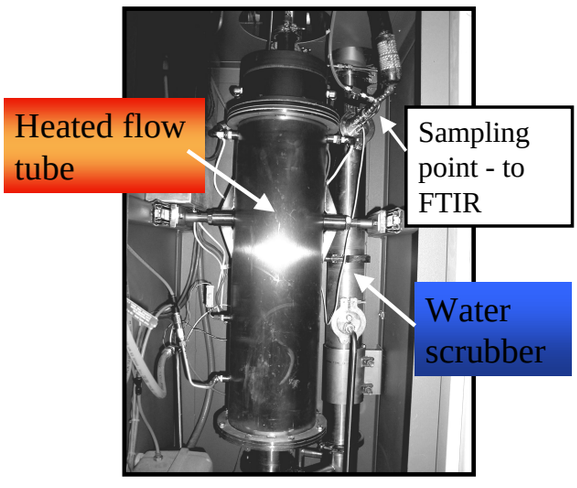
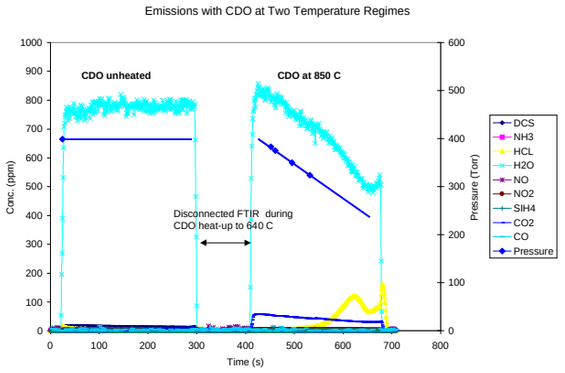


Figure 2: FTIR spectral trend plot of effluent as temperature is varied.



Reference

1. Mendicino, L., K. McCormack, D. Lyon, T. McCoy, E. Rieske, "Water and Energy Usage Reduction in Point of Use Abatement Equipment," Improving Environmental Performance of Wafer Manufacturing Processes, Semicon West, July, 2000.