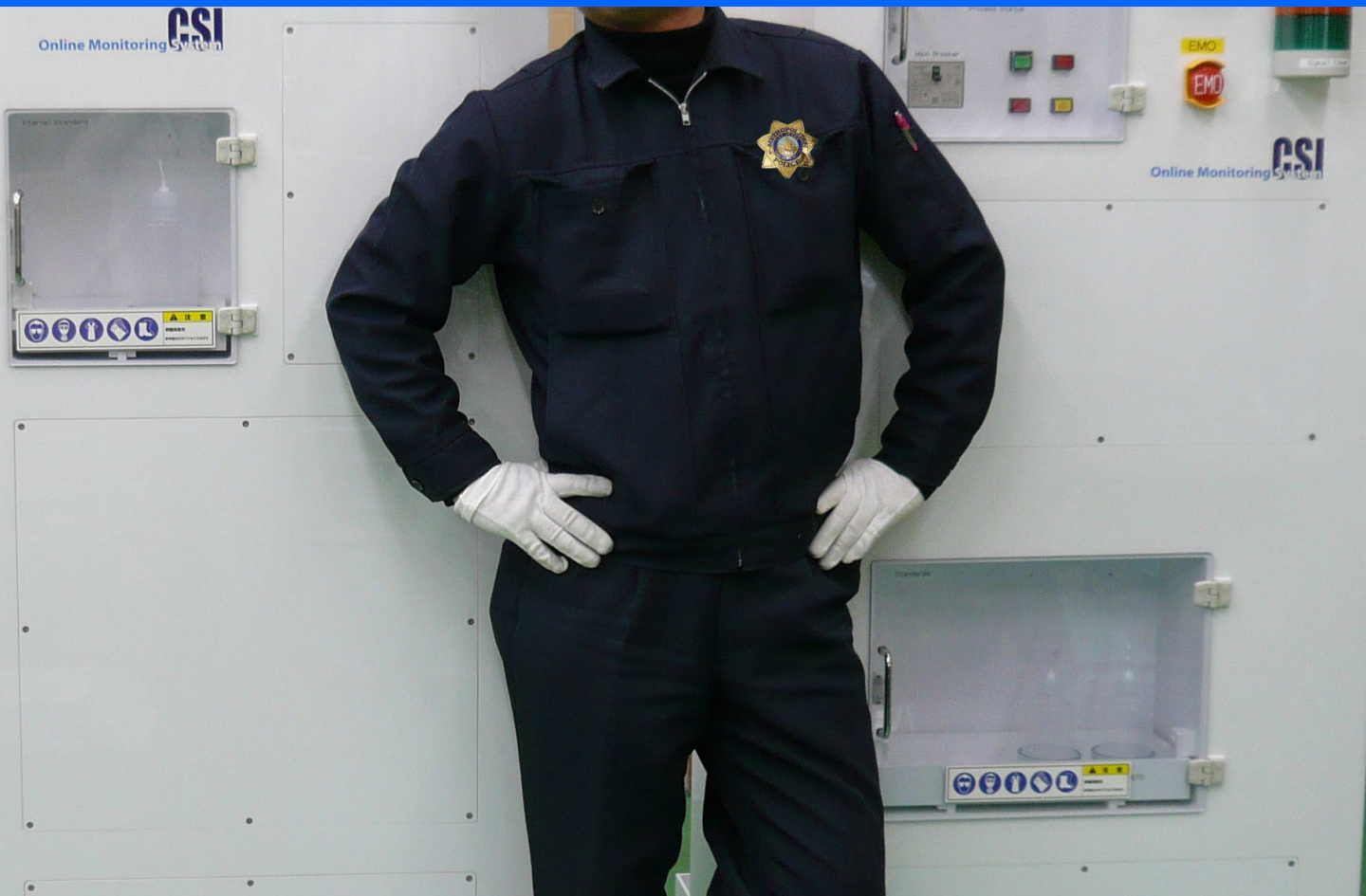




Online Monitoring System

CSI Lab

Continuous Chemical Sample Inspection



IAS Inc.

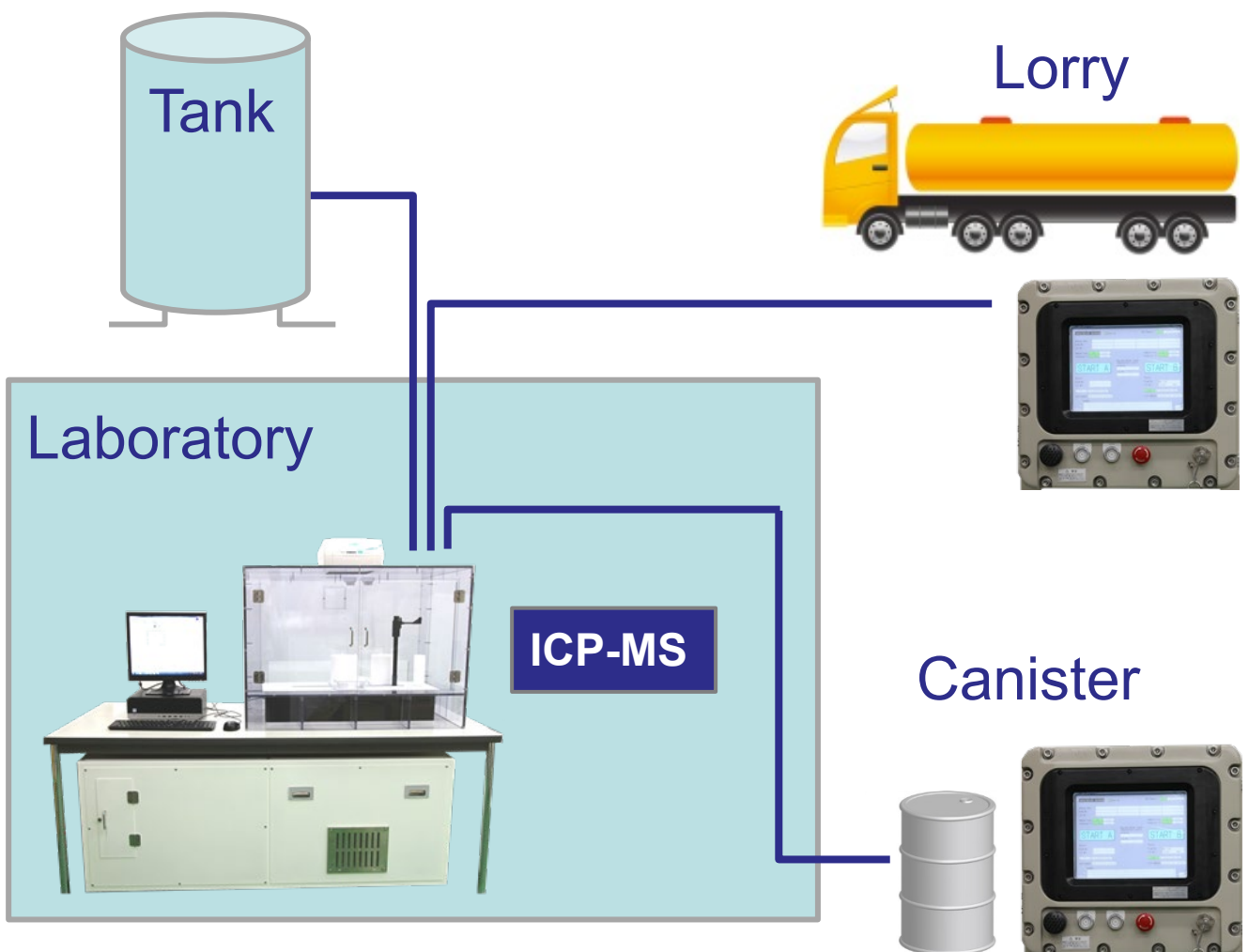
CSI Lab monitors chemicals for semiconductor process in Lab

Continuous Chemical Sampling Inspection (**CSI**) is a system that monitors ultra trace level of metallic impurities in chemicals used in semiconductor industries.

In the semiconductor device manufacturing, many different types of chemicals are used for different purpose, and metallic impurities in chemicals cause malfunction of device.

Since a single wafer processing is getting popular, risk of cross-contamination in cleaning and etching processes is getting smaller. Instead, contamination of bulk chemicals causes a huge production loss. The contamination of bulk chemical may occur when chemicals are transferred from lorries or canisters to storage tanks or after replacement of filters.

In order to avoid any contamination risk in chemicals, **CSI** has been used to monitor metallic impurities in different storage tanks by one ICP-MS sequentially for 24-7. When a lorry comes, a sample from lorry is analyzed right after the current sample.

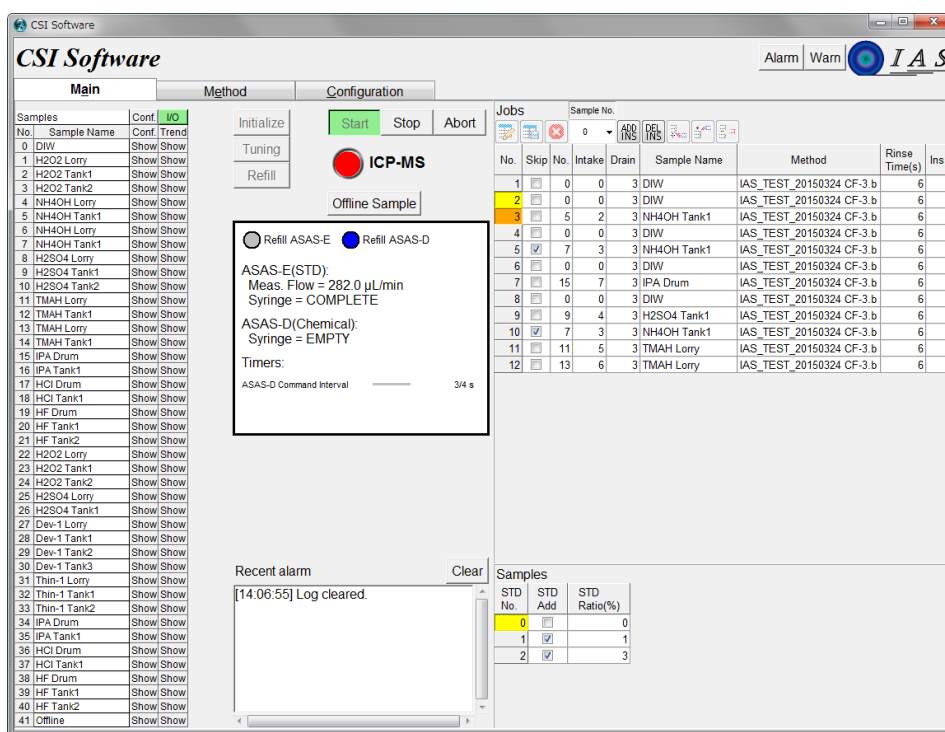


Example of CSI Lab system

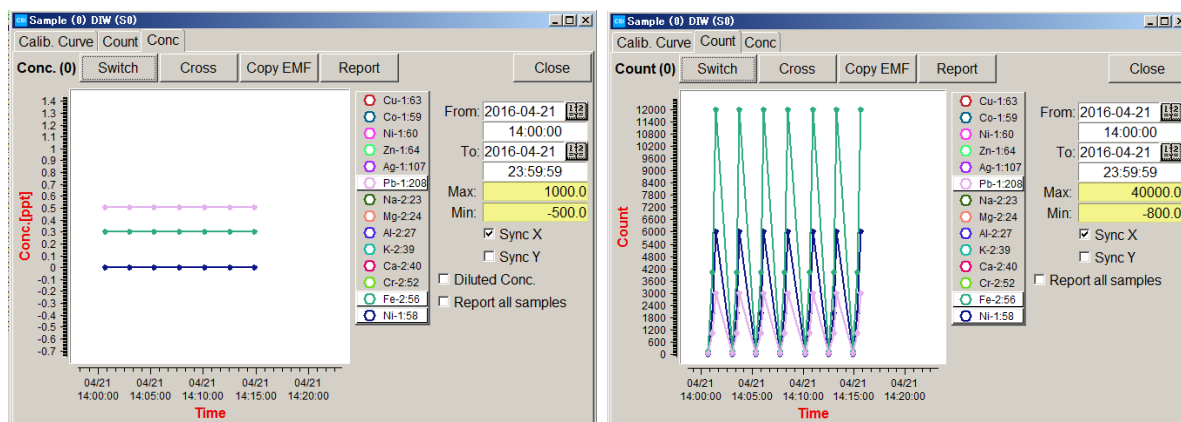
◆ **CSI Online Interface Software (OIS)** – OIS is an intelligent software that controls each valves, autosampler and ICP-MS. ICP-MS is used as a detector and all information including calibration curve is managed by OIS.

OIS has the following functions

- Automated calibration and re-calibration by the simplified method of standard addition.
- Check correlation coefficient of calibration curve, minimum sensitivity, SD and RSD, and automatic re-analysis function if results are out of limit.
- Periodic check of quality control standard (QC).
- Two concentration upper limits, and generation of alarm and output signal.
- Insertion of lorry or canister sample after the current sample.
- Change ICP-MS method for each chemical (depending on ICP-MS model).
- Trend chart in concentration and count for each sample.
- Offline sample analysis
- Communication with remote interface (Option)

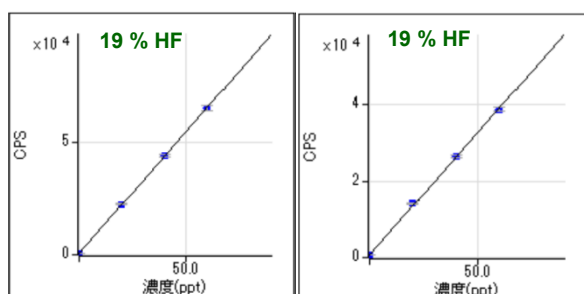


Main window of CSI software



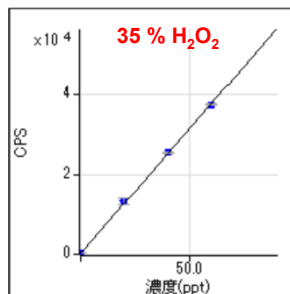
Trend graph in concentration (left) and counts (right)

The followings are standard addition calibration curves of various chemicals analyzed by LT model. All chemicals were analyzed sequentially.



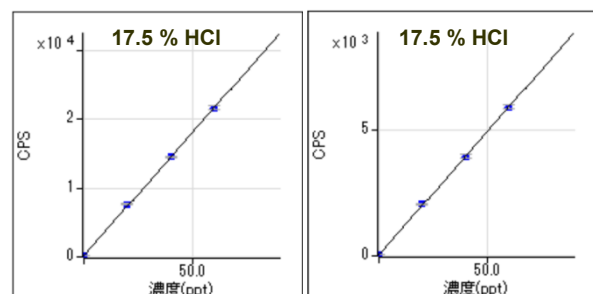
23 -> 23 Na [TSMC-Warm]
 $y = 1.087E3 x + 6.540E2$
 R 1.0000
 DL 0.07174
 BEC 0.6015

40 -> 40 Ca [TSMC-Warm]
 $y = 6.415E2 x + 6.837E2$
 R 0.9997
 DL 0.1121
 BEC 1.066



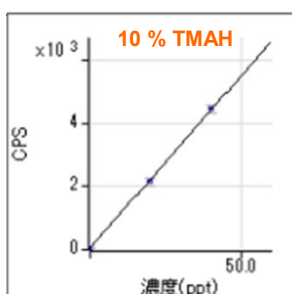
27 -> 27 Al [TSMC-Warm]
 $y = 6.262E2 x + 2.327E2$
 R 0.9998
 DL 0.0319
 BEC 0.3715

56 -> 56 Fe [TSMC-Warm]
 $y = 4.318E2 x + 4.953E2$
 R 1.0000
 DL 0.3311
 BEC 1.147



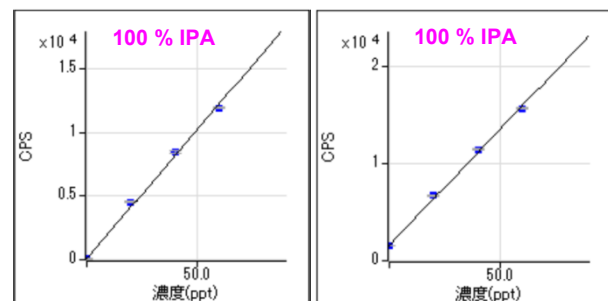
23 -> 23 Na [Warm]
 $y = 3.587E2 x + 1.980E2$
 R 0.9999
 DL 0.1647
 BEC 0.5519

59 -> 59 Co [TSMC-Warm]
 $y = 9.799E1 x + 3.500E1$
 R 0.9999
 DL 0.2806
 BEC 0.3572



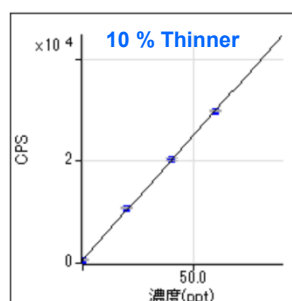
24 -> 24 Mg [Warm]
 $y = 1.090E2 x + 5.339E1$
 R 0.9996
 DL 0.3182
 BEC 0.4898

63 -> 63 Cu [Warm]
 $y = 9.607E1 x + 5.339E1$
 R 0.9981
 DL 0.6507
 BEC 0.5557



24 -> 24 Mg [1300W(I)]
 $y = 2.037E2 x + 7.534E1$
 R 0.9983
 DL 0.994
 BEC 0.3698

52 -> 52 Cr [1300W(I)]
 $y = 2.404E2 x + 1.591E3$
 R 0.9991
 DL 0.2808
 BEC 6.616



52 -> 52 Cr [TSMC-Warm]
 $y = 4.889E2 x + 6.607E2$
 R 0.9999
 DL 0.342
 BEC 1.351

64 -> 64 Zn [Warm]
 $y = 1.148E2 x + 1.387E2$
 R 0.9998
 DL 0.5068
 BEC 1.208

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