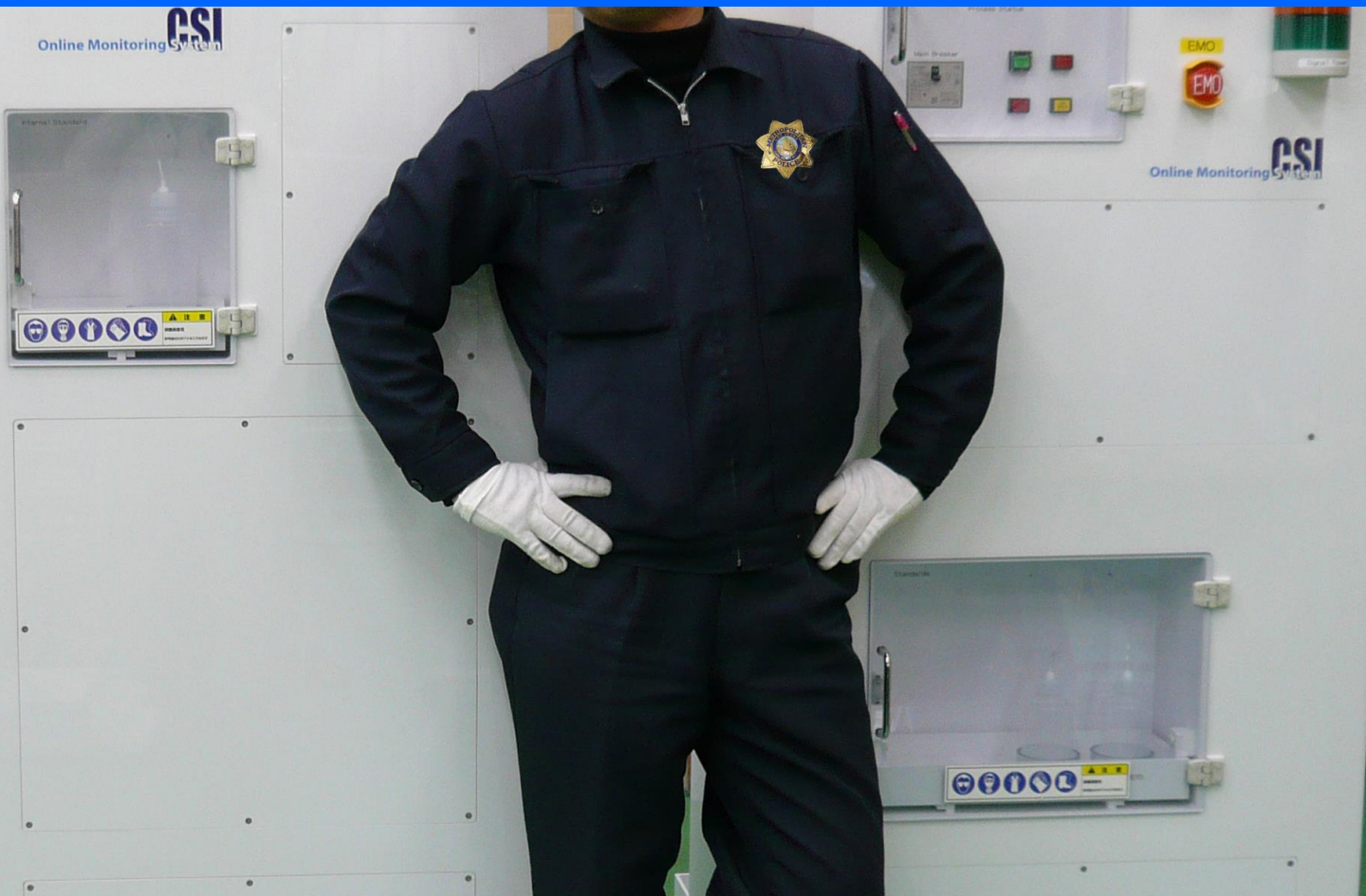# IAS

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.
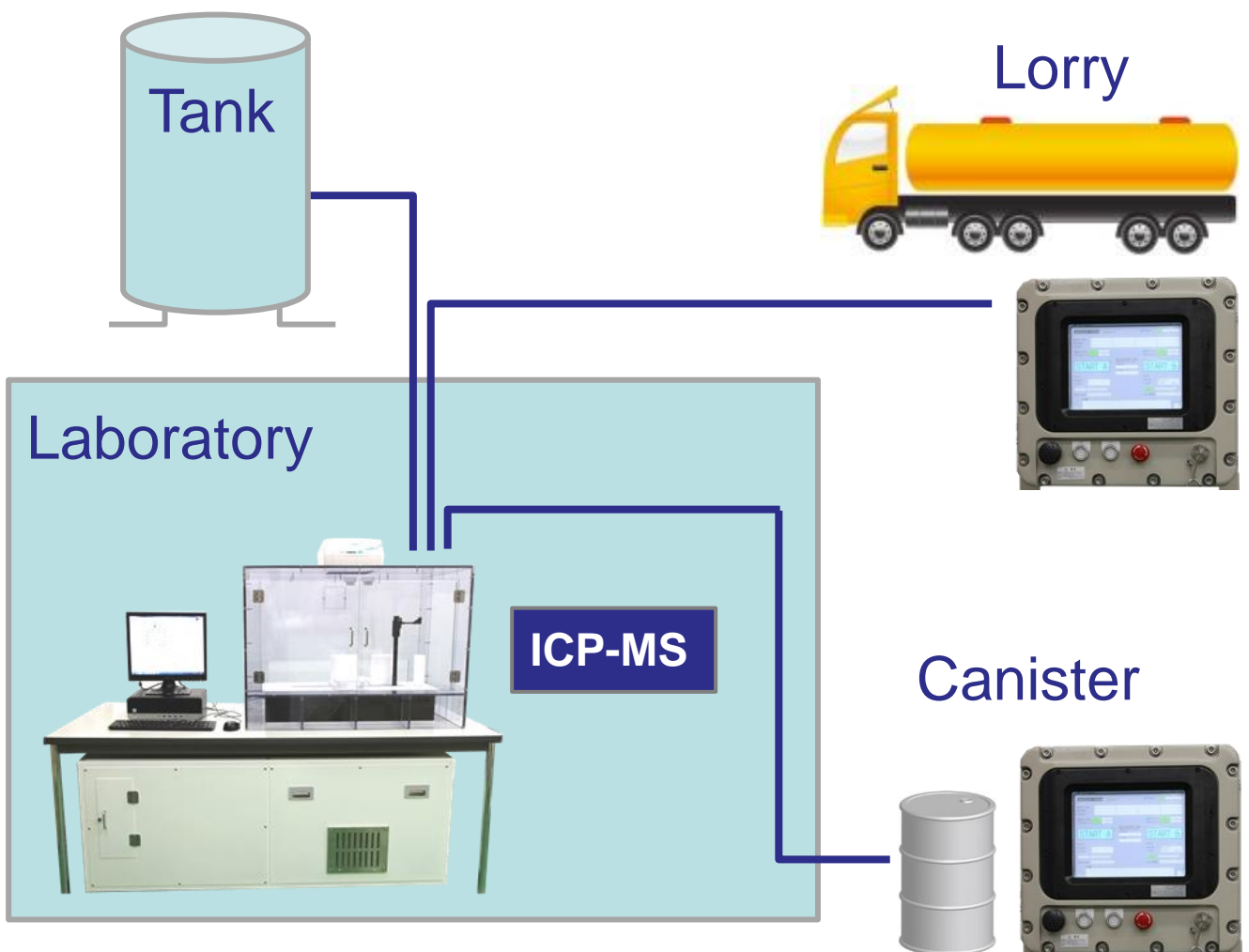

Example of CSI Lab system

◆ **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
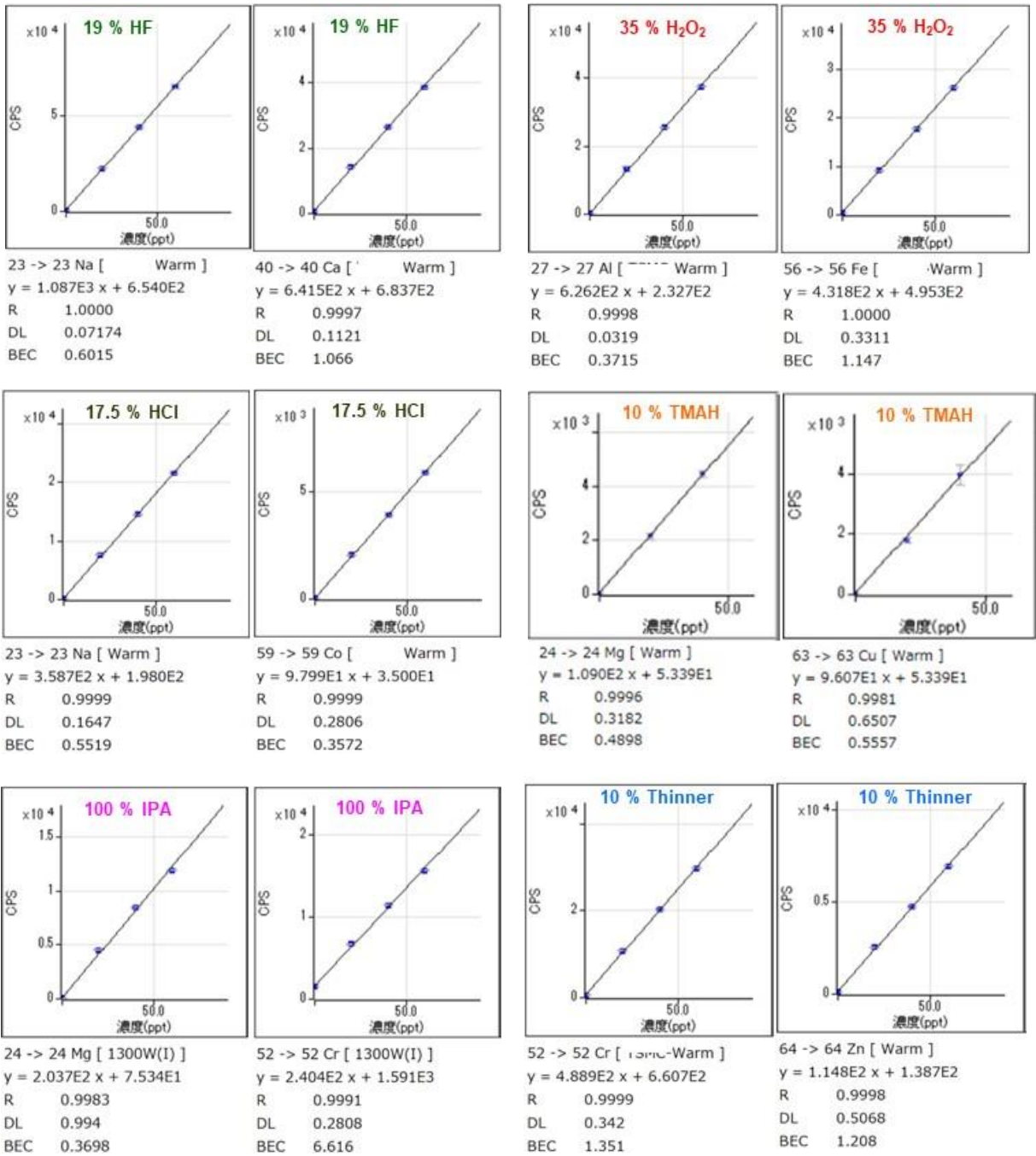- Communication with remote interface (Option)
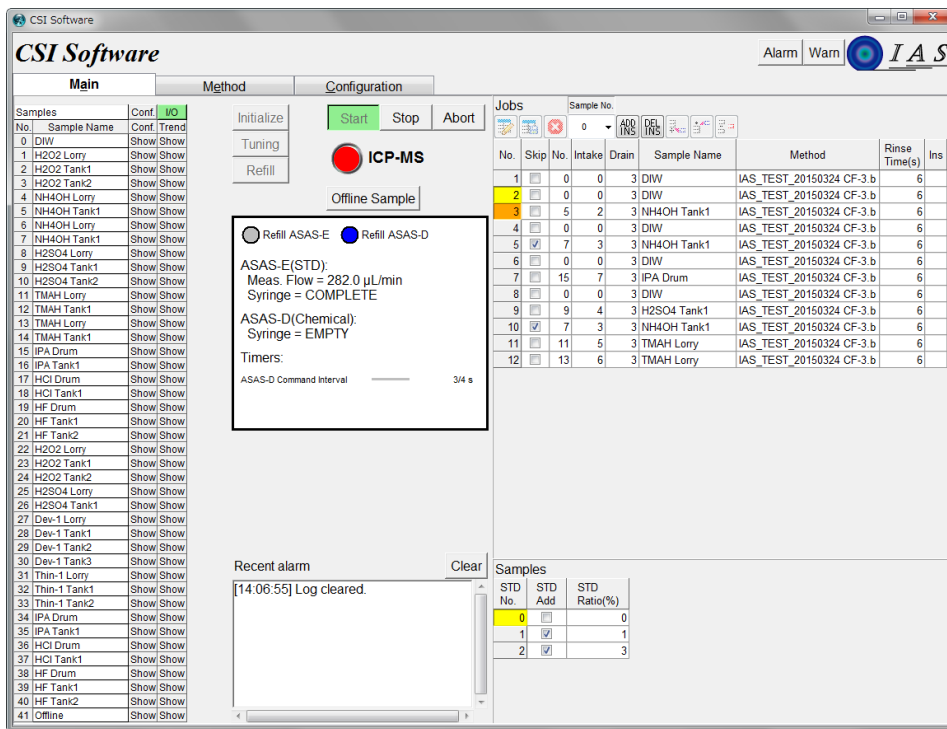
Main window of CSI software
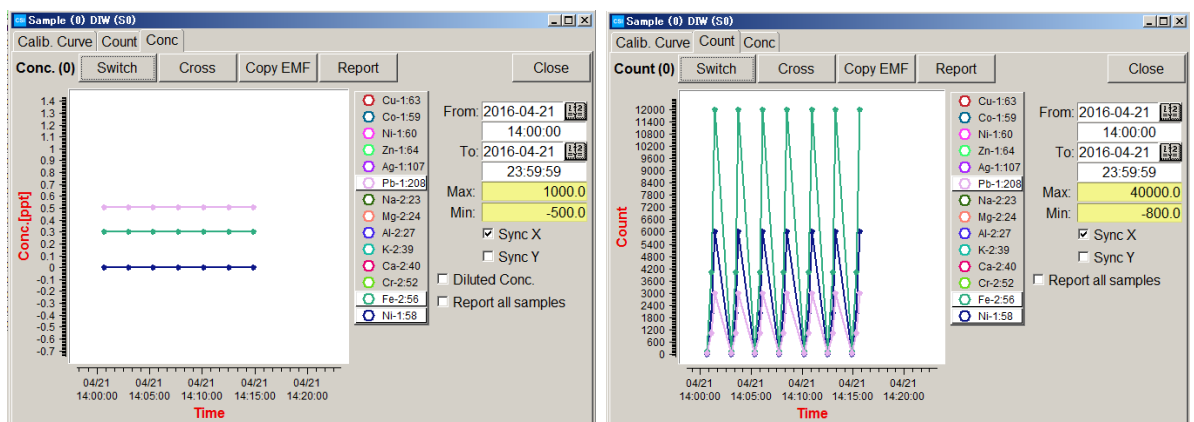
Trend graph in concentration (left) and counts (right)

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

19 % HF

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

19 % HF

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

35 % H$_2$O$_2$

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

35 % H$_2$O$_2$

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

17.5 % HCl

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

17.5 % HCl

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

10 % TMAH

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

10 % TMAH

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

100 % IPA

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

100 % IPA

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

10 % Thinner

52 -> 52 Cr [13MC-Warm]
y = 4.889E2 x + 6.607E2
R   0.9999
DL   0.342
BEC   1.351

10 % Thinner

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

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