CLAIMS

What is claimed is:

1. An arrangement for implementing an automatic in-situ process control scheme during execution of a recipe on a substrate within a processing chamber of a plasma processing system, comprising:

a plurality of control-loop sensors configured at least ~~for collecting~~ to collect a first set of sensor data to facilitate monitoring set points during said execution of said recipe, wherein said plurality of control-loop sensors being part of a process control loop;

a set of independent sensors configured at least ~~for collecting~~ to collect a second set of sensor data, said set of independent sensors being not part of said process control-loop sensors;

a hub configured ~~for~~ to at least ~~receiving~~ receive at least one of said first set of sensor data and said second set of sensor data;

an analysis computer communicably coupled with said hub and configured ~~for performing~~ to perform analysis of at least one of said first set of sensor data and said second set of sensor data, wherein said analysis computer includes a high speed processor for analyzing a high volume of data.

2. The arrangement of claim 1 further including

a fabrication facility host controller configured at least for selecting said recipe;

a process module controller configured at least for executing said recipe based on a given set of recipe set points; and

a set of metrology tools configured for providing measurement data to at least one of said fabrication host controller and said analysis computer, wherein said measurement data is available for being integrated into said recipe.

3. The arrangement of claim 1 wherein said second set of sensor data collected by said set of independent sensors is configured to include at least a partial set of data already collected by said plurality of control-loop sensors.

4. The arrangement of claim 1 wherein said second set of sensor data collected by said set of independent sensors is configured to not include data already collected by said plurality of control-loop sensors.

5. The arrangement of claim 2 wherein said analysis computer is configured at least for receiving sensor calibration data, wherein said sensor calibration data includes an empirical relationship between said set of control-loop sensors and said set of independent sensors.

6. The arrangement of claim 5 wherein said sensor calibration data is chamber specific.

tuning said recipe to a set of recipe set points;

executing said recipe;

receiving a first set of sensor data from said set of control-loop sensors and a second set of sensor data from said set of independent sensors;

analyzing at least one of said first set of sensor data and said second set of sensor data to calculate a set of virtual measurements;

comparing said set of virtual measurements to a predefined threshold; and

if said set of virtual measurements is outside of said predefined threshold, generating at least one of a warning and an alarm.

16. The method of claim 15 wherein said analyzing occurring at a predefined time interval.

17. The method of claim 16 wherein said virtual measurements is calculated based on applying a phenomenological model ~~to~~ .

18. The method of claim 17 further including determining an existence of a fault if said set of virtual measurements is outside of said predefined threshold.

19. The method of claim 18 further including determining a set of adjusted recipe set points.

20. The method of claim 19 further including determining a set of virtual actuators for tuning said recipe.