**in-situ** heating TEM observation during crystallization of amorphous Si film

It is important to clarify the structural change during annealing process in semiconductor device manufacturing. Heating behavior of materials can be observed at nm level by *in-situ* heating TEM. Information about structural change with heating can be utilized for process development.

*in-situ* heating TEM

TEM observation under controlled thermal condition

- Temp. range: 23(RT) ~ 1300 °C
- Rapid heating & Excellent stability
- Temp. & Time controlled by program

**in-situ** heating TEM observation of amorphous Si(a-Si) film

Parameter (Temp., Time)
- Heating rate
- Keeping time etc.

Crystallization from a-Si/Si sub. interface to a-Si film surface

Heating behavior of materials can be observed by *in-situ* TEM. Cross-section/Plane view TEM, Static/Moving image

Crystal structure analysis of Si film before and after heating

Crystal defect evaluation using TEM (after heating)

Combinations of *in-situ* TEM and other method (SAED, EDX)