Crystal structural change of Ga_2O_3 film evaluated by in-situ heating TEM

Gallium oxide (Ga_2O_3) is attracting much attention as a candidate material for next-generation power devices. Ga_2O_3 has several polymorphs and the crystal structural changes with the film formation temperature. In-situ heating TEM is a powerful tool for understanding such structure change.
An example of the structural analysis of a Ga_2O_3 film using in-situ heating TEM is shown below.

1. in-situ heating TEM

Dynamic TEM observation during heating.

ex.) Clarifying structural change during annealing process.

- Temperature range:23(R.T.)~1300℃
- Rapid heating with high stability
- nm-level dynamic observation
- Energy-dispersive X-ray spectroscopy (EDX) and energy loss spectroscopy (EELS) are also available.

Several samples for film temperatures are not necessary.

Gallium Oxide (Ga_2O_3)

- Wide bandgap(~5eV)
- Low cost and high-quality substrates.

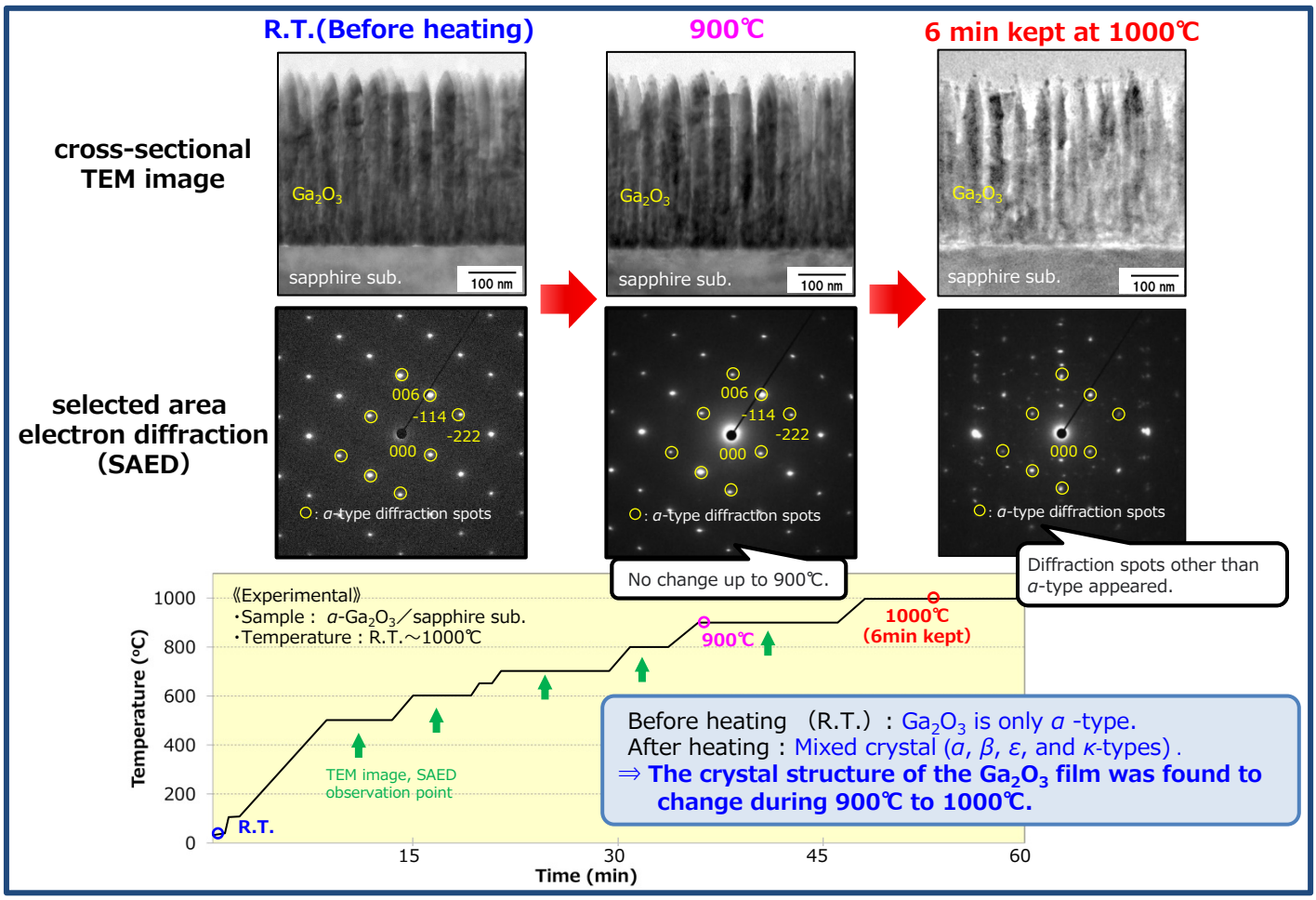
⇒**Development of high-quality Ga_2O_3 film is important**

Crystal structure changes with film formation temperature

Evaluation of crystal structure change by in-situ heating TEM

Type	Structure
α	corundum
β	monoclinic
γ	spinel
δ	cubic
ε	hexagonal
κ	orthorhombic

2. In-situ heating TEM observation of Ga_2O_3 film structural change



Toray Research Center's elaborate sample preparation technique and in-situ heating TEM yield nanometer-scale direct observation of structural phase transition of Ga_2O_3 film.

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