

Nanoscale thermal transport measurement by STEM-based thermal analytical microscopy

Keywords: Transmission electron microscopy, nanoscale thermal measurement, in-situ TEM

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Background

- It is expected to improve performance of nanostructured thermoelectric materials.
- It is necessary to develop advanced thermal transport measurement at nanoscale.
- High spatial and temperature resolution is required for thermal conductivity analysis.

Aim

- Revealing thermal transport mechanism in various kind of advanced materials
- Comprehensive nanoscale physical property measurements by TEM
- Application to nanoscale design for practical thermal-management materials

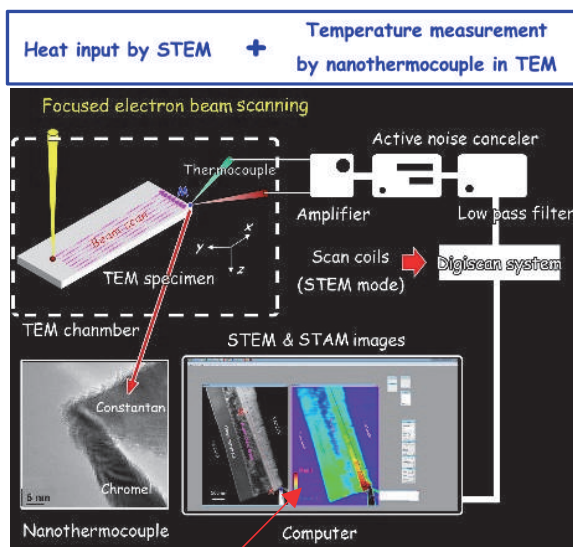
Advanced Research Topics

Nanoscale thermal conductivity analysis by STEM-based Thermal Analytical Microscopy (STAM)



Movable nanothermocouple for local temperature measurement

is introduced in 300 kV TEM Typical STEM and STAM images for nanoscale thermal conductivity



analysis can be simultaneously acquired by this system

Publications

- N. Kawamoto et al., Nanotechnology, 26 (2015) 465705.
- N. Kawamoto et al., Microscopy, 62 (2013) 157-175.
- N. Kawamoto et al., Nanotechnology, 22 (2011) 485707.

Summary

- Local temperature measurement was developed.
- Developed STAM can be applied to thermal conductivity analysis of nanostructured materials.
- Quantitative thermal conductivity measurement at nanoscale.

Research outcome

- Thermal analysis of various kind of advanced nanoscale materials.
- Development of STAM taken in wide temperature.
- Achieving quick acquisition time of STAM for electron-beam sensitive materials.