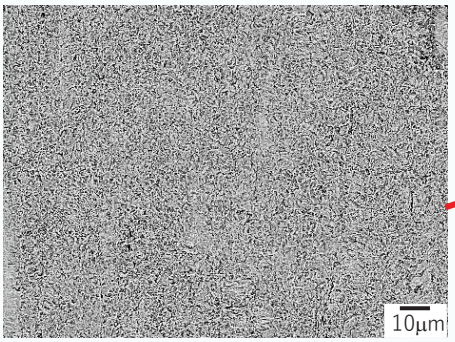
Suppression of stress corrosion cracking by process modification of conventional steel

Development of stainless steel with balanced strength and ductility and brittle fracture resistance

- Inhibits embrittlement because of changes in dissolved oxygen concentrations
- Only to reduce the grain size of general-purpose stainless steel to fine grain
- Superior strength and ductility balance over conventional stainless steel

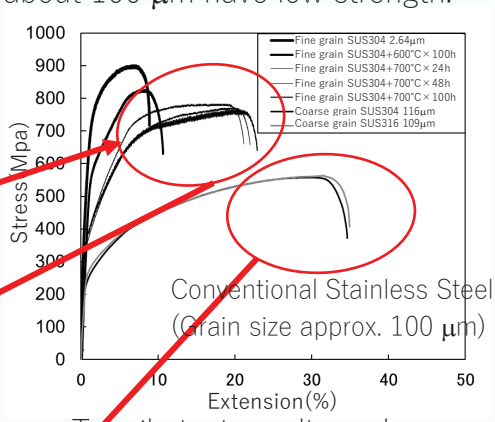
Keywords： Stress corrosion cracking, Fine grain, Dissolved oxygen, Brittle fracture rate

The present invention achieves a grain size of 2.67 μm with a material that is maintained at 600 °C to 700 °C for 100 h after being strongly worked on stainless steel.

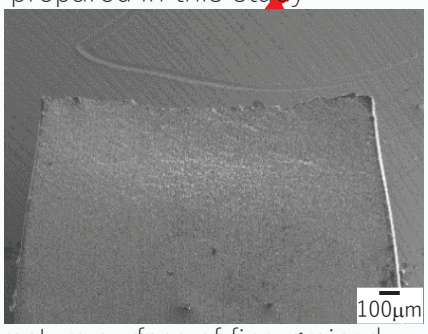


Microstructure of the material prepared in this study

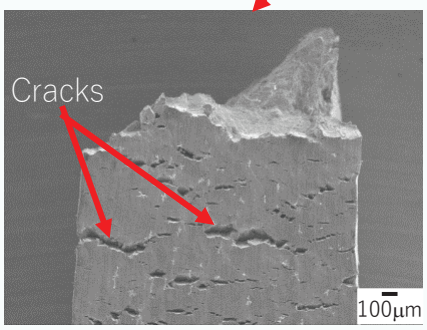
This fine-grained stainless steel have an excellent strength-ductility balance, whereas conventional stainless steel with a grain size of about 100 μm have low strength.



Tensile test results under pressurized water reactor conditions



Fracture surface of fine-grained stainless steel after 700 °C for 100 h.



Fracture surface of conventional stainless steel (Grain size 116 μm) after testing.

The brittle fracture rate of the fine-grained stainless steel was 5%. However, conventional stainless steel had a brittle fracture rate of 24% because of cracking.

Fine-grained stainless steel had excellent resistance to stress corrosion cracking.

Stage of Technology

- **Basic research**
- Applied research
- Practical development
- Productization
- Commercialization

Fields of use

- Materials for LWRs
- Automotive and portable electronic device chassis

Information of intellectual property

Patent No. US11597982

Technical details

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