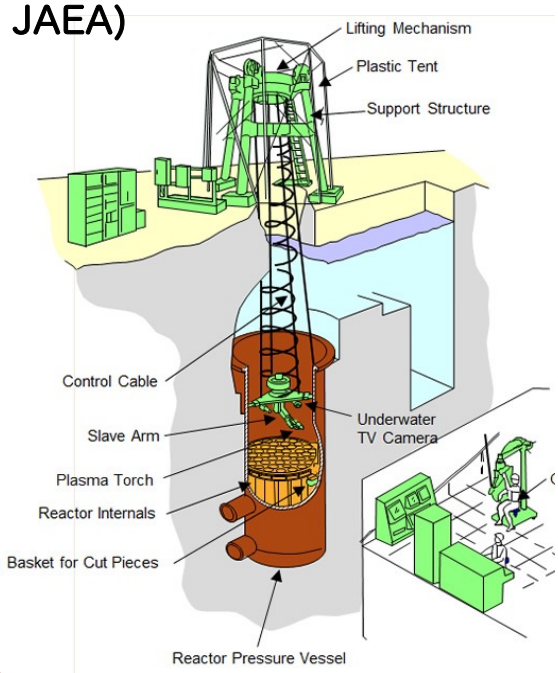
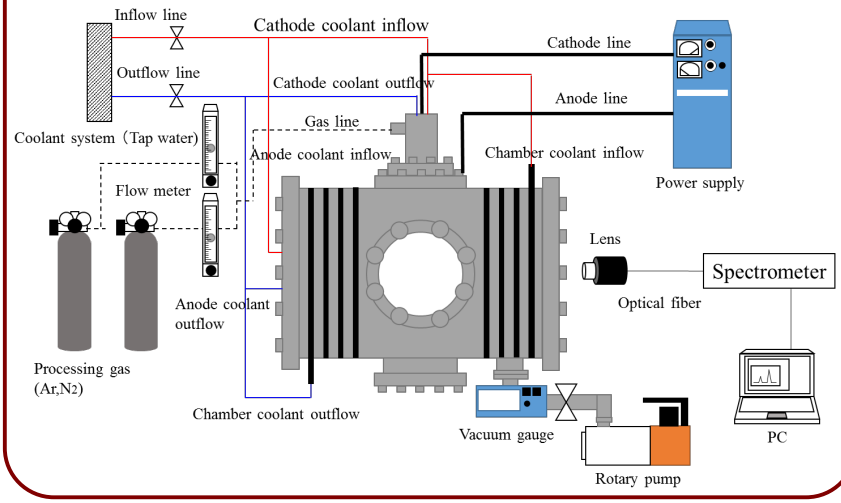
Applications 1 Application to nuclear reactor decommissioning — Possibility of remote dismantling/local decontamination of reactor internals by arc plasma

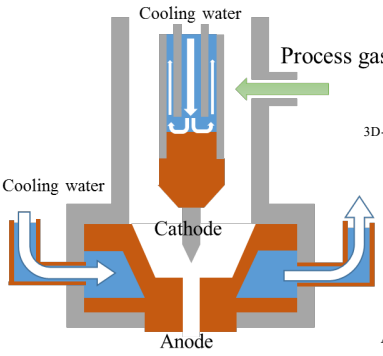
Concept (by courtesy of JAEA)

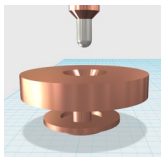


Lab-scale non-radioactive experiments



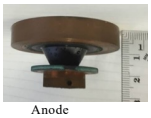
Electrodes



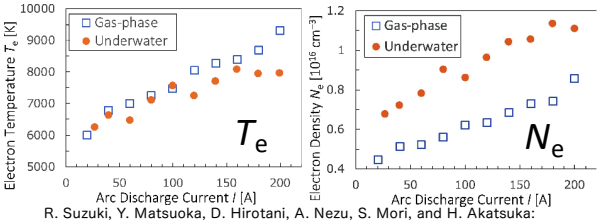

3D-CAD image

Cathode

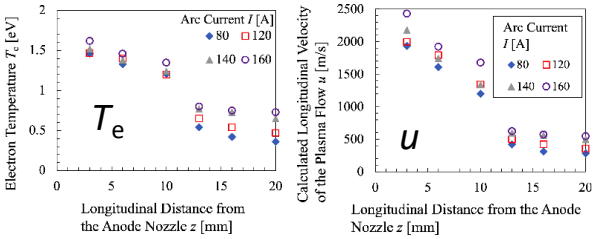
Anode jacket


Anode

OES measurements



R. Suzuki, Y. Matsuoka, D. Hirotani, A. Nezu, S. Mori, and H. Akatsuka: IEEJ Trans. Elec. Electron. Eng., 16.3 (2021): 364-373.



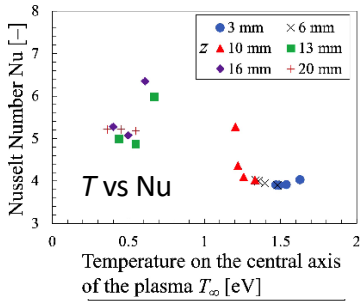
R. Suzuki, D. Hirotani, Y. Matsuoka, A. Nezu, S. Mori, and H. Akatsuka, IEEJ Trans. Elec. Electron. Eng., **16**, 364 (2021).

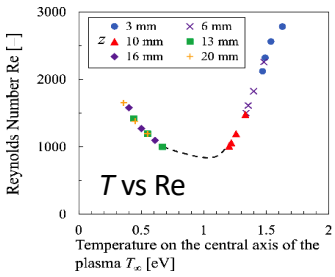
Plasma-water heat transfer properties

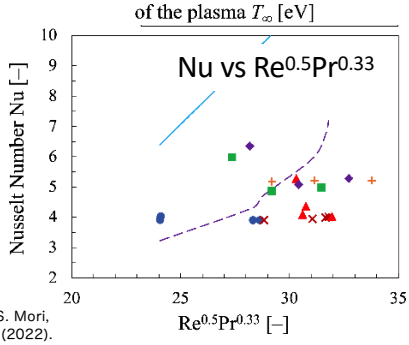
Nusselt number for plasma Nu

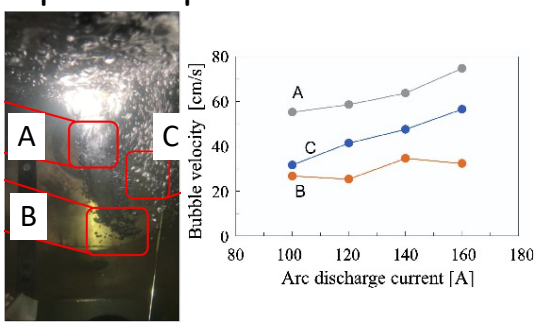
$$\mathrm{Nu} = \frac{h^* C_p D_e}{\lambda_c} \qquad q = h^* \left(h_p - h_w \right)$$

h^* : Heat transfer coefficient, determined from enthalpy difference between plasma and water and heat flux q
C_p specific heat under constant pressure
D_e Diameter of the plasma column
λ_c Average thermal conductivity of plasma







J. Kawamura, D. Hirotani, Y. Matsuoka, R. Suzuki, A. Nezu, S. Mori, and H. Akatsuka, IEEJ Trans. Elec. Electron. Eng., **17**. 1396 (2022).

Flow properties of aqueous phase