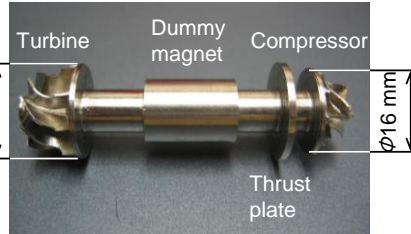
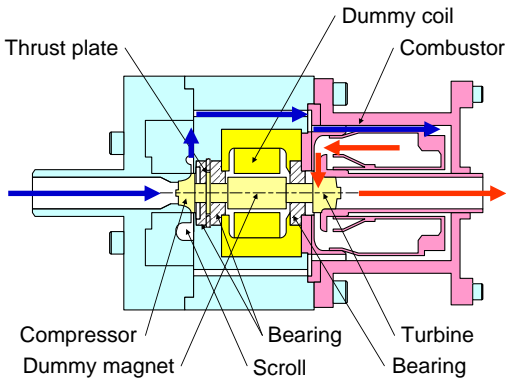


Power MEMS (Tanaka et al.)

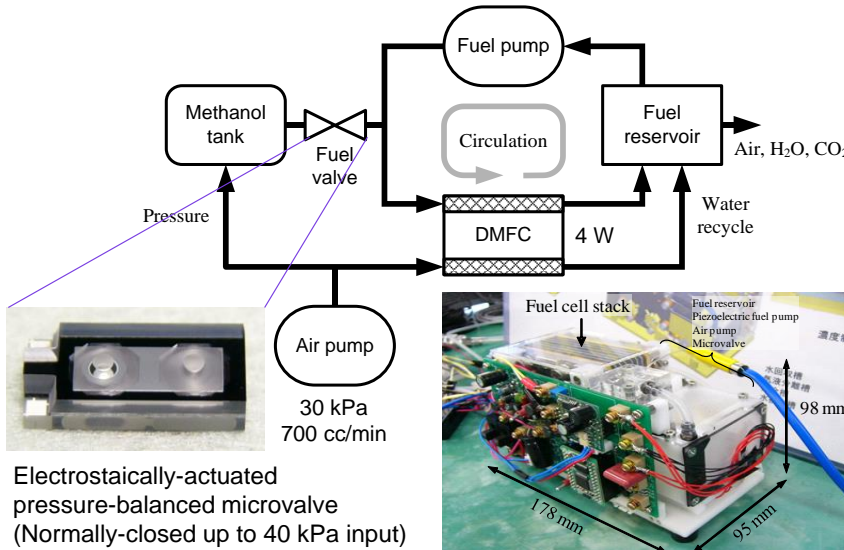
Ultra-small Gas Turbine Generator



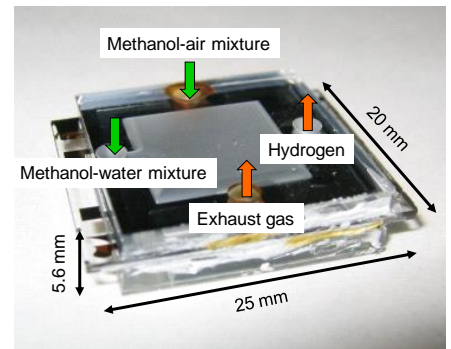
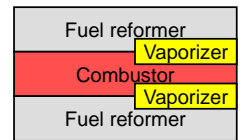
World's smallest gas turbine (2007)
 (Collaboration with IHI, Tohoku Gakuin Univ. etc.) (Inconel one-piece structure)
 (Tanaka *et al.*, PowerMEMS 2007, pp. 359-362)

Portable gas turbine generator
 prototyped by IHI (2012)
 (Based on achievement in 2007)

Portable Fuel Cell



Reactor configuration

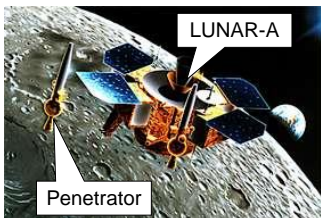
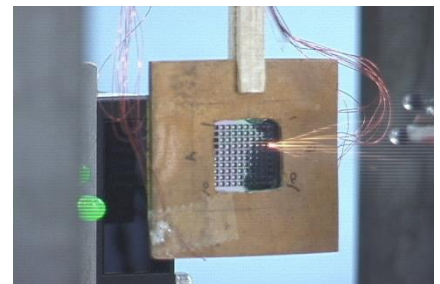
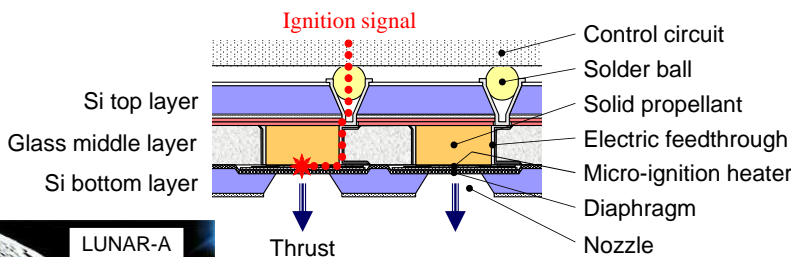


Electrostatically-actuated pressure-balanced microvalve
 (Normally-closed up to 40 kPa input)

Electrostatic MEMS valve and direct methanol fuel cell system using the valve
 (Collaboration with Panasonic Electric Works)
 (K. Yoshida *et al.*, Sensors and Actuators A, 157 (2010) p pp. 290-298, p. 299-306)

Integrated micro fuel reformer
 (Collaboration with Panasonic Electric Works)
 (K. Yoshida *et al.*, J. Micromech. Microeng., 16 (2006) pp. S191-S197)

Micro Rocket Array Thruster



Structure of micro rocket array thruster
 (Collaboration with ISAS/JAXA and Nichiyu Giken Kogyo)
 (S. Tanaka *et al.*, Trans. Jpn. Soc. Aeronautical Space Sci., 46, 151 (2003) pp. 47-51)

Micro rocket array thruster under test

The micro-thruster was developed for Penetrator injected to lunar surface.