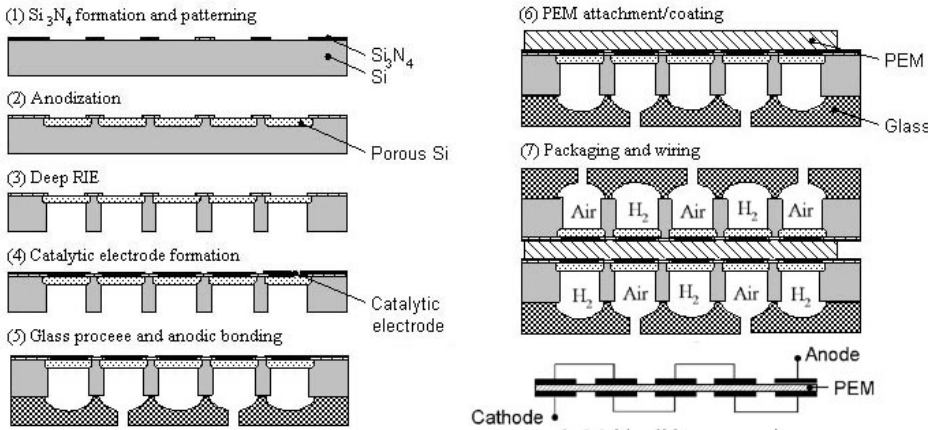
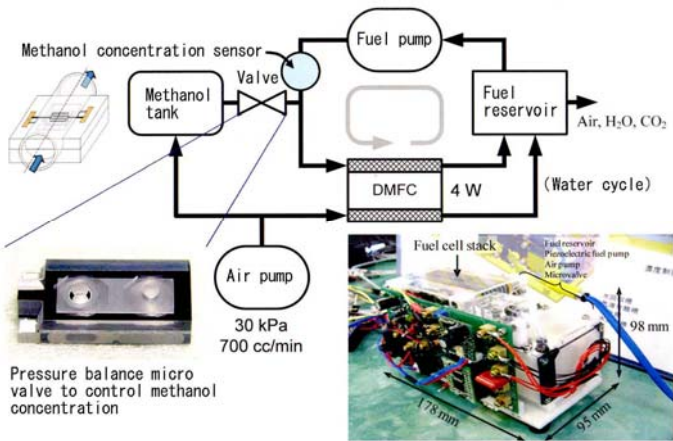


Micro Fuel Cell

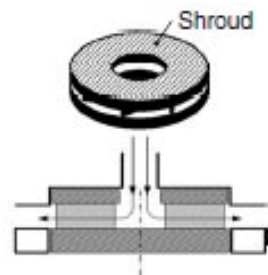


Polymer Electrolyte Membrane (PEM) fuel cell using porous Si as gas permeable membrane

Reference : K.B.Min, S.Tanaka and M.Esashi, MEMS-Based Polymer Electrolyte Fuel Cell, *Electrochemistry*, 70 (2002) pp.924-927



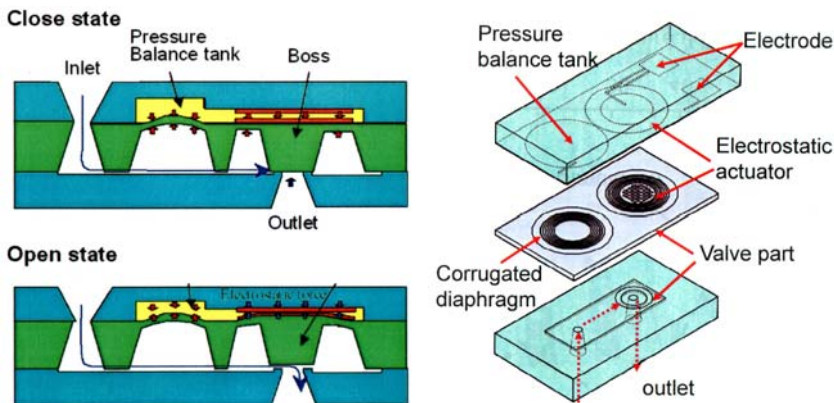
Direct methanol micro fuel cell system (Tohoku Univ. – Matsushita Electric Works)



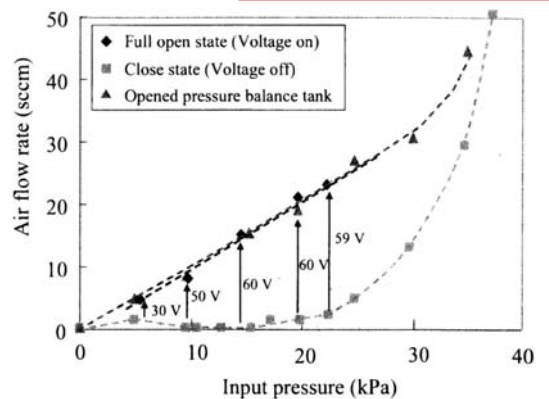
Turbo air pump with SU-8 impeller (Tohoku Univ. – Nippon Kayaku)



Microvalve by pressure balance mechanism



Pressure balance type micro valve (Tohoku Univ. – Matsushita Electric Works)



Reference :

S.Tanaka, K.-S.Chang, K.-B.Min, D.Satoh, K.Yoshida and M.Esashi, MEMS-based Components of a Miniature Fuel Cell/fuel Reformer System, *Chemical Eng. J.*, 101 (2004) pp.143-149

K.Yoshida, S.Tanaka, Y.Hagihara, S.Tomonari and M.Esashi, Normally Closed Electrostatic Microvalve with Pressure Balance Mechanism for Portable Fuel Cell Application, *Sensors and Actuators A*, 157 (2010) pp.290-298

R.Hino, M.Esashi and S.Tanaka, Antisymmetric-mode Lamb Wave Methanol Sensor with Edge Reflectors for Fuel Cell Applications, *Technical Digest MEMS 2010* (2010) pp.871-874

A.Nakajima, P.Kang, N.Honda, K.Hikichi, M.Esashi and S.Tanaka, Fabrication and High-speed Characterization of SU-8 Shrouded Two-dimensional Microimpellers, *J.of Micromech. Microeng.*, 17 (2007) pp.S230-S236

