

Design of a Cold Gas Micro Thruster

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Micro satellites require miniaturized propulsion systems in order to control the relative distance between these satellites. Due to miniaturization of satellites and therefore the need for very small subsystems, new technology has to be explored. By using micro system technology, complex systems can be integrated resulting in a significant mass and volume reduction. A novel design of a cold gas micro thruster, using micro system technology, is presented. The system consists of a nozzle, a valve, a filter and a pressure transducer. The micro thruster is designed to be used for formation flying of micro satellites [1] [2] and is compatible with a gas tank based on micro cool gas generator technology which is developed by TNO [3].

Figure 1 and 2 give an impression of the system. A glass tube is bonded to a silicon wafer which contains a nozzle and a valve seat. The piezo-disc is used to actuate the valve. On top of the piezo-disc a silicon wafer is stacked which contains a filter. Finally a silicon ring with a micro fabricated pressure transducer is added. The thread on the glass tube makes it easy to connect the module to the gas tank or macro world.

The design, fabrication and first results will be presented in the poster session during the symposium.

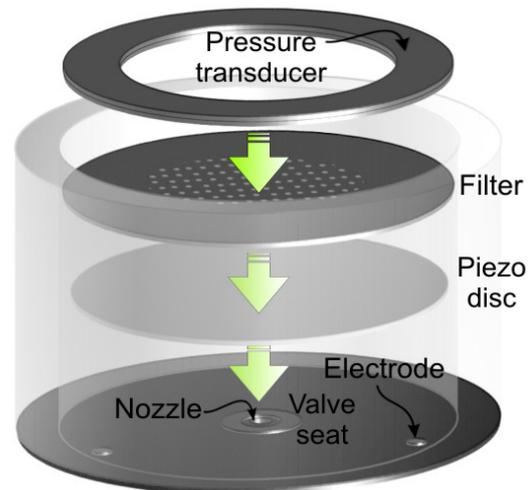


Fig. 1 Conceptual design of a micro thruster module containing a nozzle, a piezo-electrical valve, a filter and a pressure transducer.

References

- [1] J. Moerel, E. Dekker, A. Hogedoorn, 'System Requirements Document', 31-3-06
- [2] E.J. Dekker, 'Feed System Miniaturization For Micro Propulsion', June 2006.
- [3] N. Rackemann, 'Design and Development of a Propulsion System for a Cubesat – Based on Micro Cool Gas Generator Technology', 29-3-06

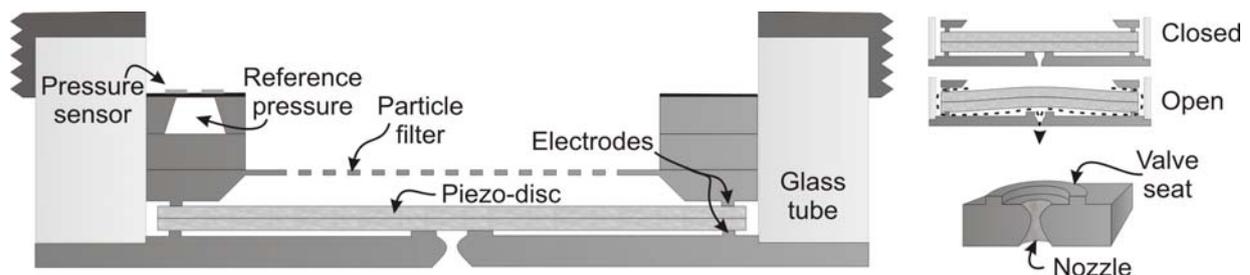


Fig. 2 Design of a micro thruster module.