PLANETARY ATMOSPHERIC COMPONET MEASUREMENTS USING OSCILLATING MEMS BASED

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In a previous paper, we presented the concept of Micro-Electromechanical Planetary Probes (MEMPPs) [McComas et al, 2005]. MEMPPs use Micro-Electromechanical Systems (MEMS) to make highly integrated, mechanically robust probes with a much smaller size, mass, and power requirement than traditional planetary probes. These small probes allow for lower cost missions and for missions with large numbers of distributed probes. We are developing a MEMPPs sensor that will measure specific components of an atmosphere. This sensor consists of an oscillating beam with a treated surface. The surface treatment is tailored to adsorb a specific component of the atmosphere of interest, such as water or hydrogen sulfide. As material adsorbs on the oscillator, the increase in mass will cause the resonance to shift to lower frequencies. Measurement of the frequency shift tells us the concentration of the specific component in the atmosphere. This MEMPPS sensor is simple and robust, allowing it to be deployed to depths beyond that standard mass spectrometers could survive without a pressure vessel. MEMPPs including this sensor could be used to augment a traditional probe mission. A more traditional mass spectrometer would be used to make a thorough measurement of the atmospheric composition, while many MEMPPs probes focusing on a few key components of the atmosphere would be deployed with wide spatial coverage and to deeper depths than probes requiring pressure vessels.

McComas, D.J., S. Cerwin, F. Crary, J. Helffrich, J. Mitchell, D. Strickland, and P. Valek, Micro-electromechanical planetary probes (MEMPPs), *Proceedings of the 3rd International Planetary Probe Workshop*, 2005.