NASA SBIR 2008 Phase I Solicitation

S1.09 In Situ Sensors and Sensor Systems for Planetary Science

Lead Center: JPL

Participating Center(s): ARC, GSFC, JSC, LaRC, MSFC

This subtopic solicits development of advanced instruments and instrument components that are tailored to the demands of planetary instrument deployment on a variety of space platforms (orbiters, flyby spacecraft, landers, rovers, balloon or other aerial vehicles, subsurface penetrators or impactors, etc.) accessing the wide variety of bodies in our solar system (inner and outer planets and their moons, comets, asteroids, etc.). For example missions see: http://science.hq.nasa.gov/missions/solar_system.html.

Specifically, this subtopic solicits instrument development that provides significant advances in the following areas:

- Reduced mass, power, volume, data rates for instruments or instrument components that could be achieved in optomechanical components (e.g., room temperature lasers, detectors, mixers, microvalves, optical components and structures, gas and liquid pumps, ion sources, light sources from UV to microwave, seismometers, etc.) or electronics (e.g., FPGA, ASIC implementations, advanced array readouts);
- Improved g-force survivability for rough landings on Mars, Moon, or comet/asteroid bodies;
- Mitigation strategies for tolerance to high-radiation environments like that around Europa;
- High temperature and/or high pressure lifetime improvement for instruments landed on Venus;
- Low temperature survivability or lifetime improvement for instruments landed on cryogenic outer planet bodies or deployed to the subsurface;
- Advanced sample handling and manipulation technologies for challenging environments and planetary protection.

Proposers are strongly encouraged to relate their proposed development to (a) future planetary exploration goals of NASA; and (b) existing flight instrument capability to provide a comparison metric for assessing proposed improvements.

Instruments for both remote sensing and in situ investigations are required for NASA's planned and potential solar system exploration missions. Instruments are required for the characterization of the atmosphere, surface, and subsurface regions of planets, satellites, and small bodies. These instruments may be deployed for remote sensing, on orbital or flyby spacecraft, or for in situ measurements, on surface landers and rovers, subsurface penetrators, and airborne platforms. In situ instruments cover spatial scales from surface reconnaissance to microscopic investigations. These instruments must be capable of withstanding operation in space and planetary environmental extremes, which include temperature, pressure, radiation, and impact stresses.

Proposals should show an understanding of one or more relevant space science needs, and present a feasible plan to fully develop a technology and infuse it into a NASA program.