NASA SBIR 2009 Phase I Solicitation

X2.04 Spacecraft Fire Protection

Lead Center: GRC

Participating Center(s): JPL, JSC, KSC, MSFC

NASA's fire protection strategy consists of strict control of ignition sources and flammable materials, early detection and annunciation of fires, and effective fire suppression and response procedures. Providing effective and efficient means for conducting and monitoring post-fire cleanup and restoration of the cabin atmosphere to a habitable environment are also major concerns. While proposals for novel technologies in all of these areas are applicable, they are particularly sought in the areas of nonflammable crew clothing and advanced carbon monoxide sensors for fire detection and monitoring the progress of post-fire cleanup.

The requirements for crew clothing are balanced between appearance, comfort, wear, flammability and toxicity. Ideally, crew clothing should have durable flame resistance in a 34% O_2 (by volume) enriched environment through all end-use conditions including cleaning methods and frequency.

Fire detection strategies are being developed that combine advanced particulate detection technology with sensors that detect gaseous combustion products. Monitoring of carbon monoxide is being targeted both for fire detection and to monitor the progress of post-fire cleanup. A robust optical method is desired that has the dynamic range required to detect and monitor CO from approximately 1 to 500 ppm with resolution to 1 ppm CO. In addition to being sufficiently rugged, this sensor must have minimal mass, power, and volume requirements and exhibit high degrees of reliability, minimal maintenance, and self-calibration under varying humidity and ambient pressures.