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BIOREDUCTION OF SOLID ROCKET MOTORS FOR PLANETARY PROTECTION

Abstract

Solid rocket propulsion systems have been used for in-space applications including planetary exploration missions for many years. Current NASA science lander projects require solid rocket propulsion systems to touchdown on the surface of potentially life-supporting planets and moons. A critical requirement of these missions is the prevention of accidental transportation of Earth's microbes to these environments. This mission requirement places an increased importance on the ability to reduce the biological burden that may be on board the solid propulsion systems and potentially deposited in a habitable environment. Some traditional interplanetary spacecraft decontamination operations could reduce the reliability of the solid propulsion system, indicating a need for new decontamination procedures. New techniques for biological burden reduction are being studied and may become the method of choice to ensure adequate reduction has been achieved. These techniques include antimicrobial effects of chemical agents already present within the motor and cellular disruption due to assembly and operational environments induced in the motor. Recent investigations into the effectiveness of these techniques have generated promising experimental results.