NASA SBIR 2018 Phase I Solicitation

A1.10 Hypersonic Seal Technology Development

Lead Center: LaRC

Participating Center(s): GRC

Technology Area: TA14 Thermal Management Systems

NASA is developing advanced high temperature seals for a variety of applications. The seals must operate in high heat flux, oxidizing environments and restrict the flow of hot gases at temperatures on the order of 2000Â° F. To stay in contact with opposing sealing surfaces, the seals must remain resilient after repeated loading as the high-temperature surfaces around them move. Seal preloading elements, in various spring-like forms, can be incorporated within or behind a seal to provide the required resiliency. Spring tubes knitted from high temperature wire materials have been used inside high temperature seals, but they have been shown to lose resiliency and take on a permanent set at temperatures as low as 1200Â° F. Compression springs, canted coil springs, wave springs, and other unique configurations have all been evaluated as preload devices behind a seal with varying levels of success. For each design, though, material selection was a driving factor in the amount of resiliency exhibited by each type of seal preload device. Therefore, unique combinations of materials and designs will be required to achieve improved resiliency at the higher temperatures anticipated for future seal applications. NASA is interested in developing spring-like devices made of ceramic materials (e.g., silicon nitride) to use as preloading-seal elements applicable to these challenging environments. The overall goal is to develop seals that remain in contact with opposing sealing surfaces at higher temperatures for longer periods of time than current state of the art designs thus making them more reusable.