

FLUID-INFUSED ELASTOMERS

WITH IMPROVED RESISTANCE TO
HIGH TEMPERATURE DEGRADATION

Patent Pending

SD# 13935

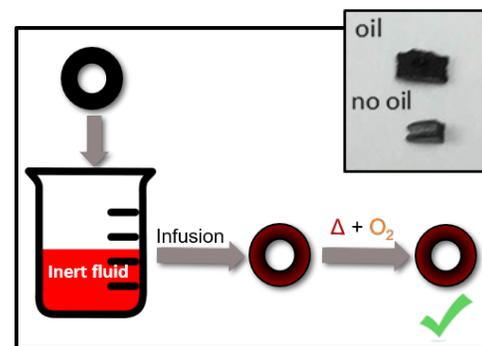
Technology Readiness Level (TRL): 5

Key elements demonstrated in relevant environments

Fluid-infused elastomers with improved resistance to high-temperature degradation

Elastomers are polymeric materials with elastic properties used in gaskets, seals, tubing, and other products that provide critical sealing functions in diverse settings. Throughout the course of service, these items can encounter harsh chemicals, friction, high pressure, and high temperatures which result in degradation and a need for ongoing maintenance and replacement. Most improvements in elastomer performance to date have involved minor formulary changes. Additionally, elastomers that can perform in temperatures in excess of 200°C are limited in their availability and tend to be costly.

By infusing elastomer materials with thermally stable fluids, Sandia researchers have developed an approach for improving the reliability and degradation resistance of elastomers in high temperature conditions. The simple and straightforward process applies elevated pressure or temperature to infuse chemically inert fluids into the material to create a barrier between the elastomer and the degradative conditions. The fluid-treatment process can be applied to readily available finished products prior to putting them into service and does not require modification of existing manufacturing workflows. More durable elastomeric materials would reduce labor, materials, and downtime involved in maintenance and replacement, and has the potential to unlock significant cost-savings for diverse industries and applications.



Upper: Elastomer shown after aging under compression, with and without infusion.
Lower: Elastomers infused with high temperature stable oils inhibit degradation and extend useful lifetime.

TECHNICAL BENEFITS

- Improves the service life and reliability of polymers in high temperature and hostile environments
- Reduced operating cost and upkeep in the form of labor, materials, and downtime
- Can be applied to finished goods-treatment method requires no modification to existing production processes

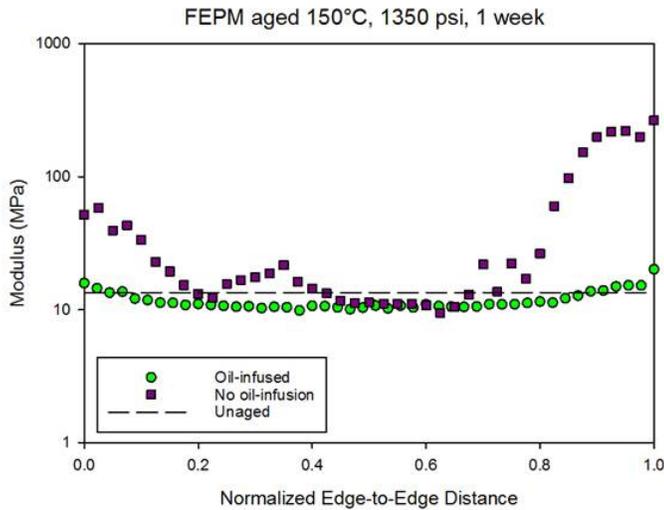
INDUSTRIES & APPLICATIONS

- Oil and gas
- Aerospace
- Agriculture
- Textiles
- Transportation
- Nuclear power
- Mining

HIGH PERFORMANCE DUAL-MODE OSCILLATOR CIRCUITS

Patent Pending
SD# 15515
Technology Readiness Level:

Additional figures:



Left: Little to no evidence of edge embrittlement (degradation) for oil-infused material after aging at 150 °C.