

# Cermet Development for High Temperature and High Pressure Applications

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## Abstract

Many traditionally used low cost alloys are easily corroded in steam or supercritical CO<sub>2</sub>. An effective solution is to utilize ceramic heat exchangers that are often integrated with metallic components which result in a significant thermal expansion mismatch. The goal of this project is to develop a sealing method to create a hermetic joint between the ceramic and metal alloy. Proposed is a seal ring containing a cermet powder with a coefficient of thermal expansion (CTE) higher than the ceramic and metal to produce a high temperature compressive seal. Cermets of Ag and MgO have been selected to withstand pressures of 3000 psi and temperatures above 700 °C. Three preliminary tests were conducted to study the behavior of the cermet: 1. Static heat on cermet filled stainless steel tubes; 2. Radial compression test on cermet filled stainless steel tubes; 3. Compression tests on open cermet filled cavities. Tests 2 and 3 suggest that powder flowability and densification regions decrease with increased ceramic concentrations.