

## Case Study

### Research and Development in Nanomaterials used for Brazing Applications

**CUSTOMER:** U.S. Department of Energy (DoE)  
**CONTRACT #:** DE-FG02-07ER84934  
**PROJECT NAME:** SBIR Project, "A High Temperature Sealing Technology for Gas Separation Devices"  
**PROJECT DURATION:** 2007-2008

#### OVERVIEW

The US Department of Energy solicited a SBIR/STTR request for proposal (RFP) for the development of new sealing methods for the joining of ceramics to metals. In this project, Aegis Technology developed a proprietary process known as reactive air brazing (RAB) for joining ceramics including  $\text{Al}_2\text{O}_3$  (alumina), YSZ, and LSCF to metals including Fecralloy and Croffer-22APU. Aegis Technology was awarded the project in 2007 and completed the project in 2008.

#### DELIVERABLES

Aegis Technology delivered several brazed parts. In the process, Aegis Technology conducted:

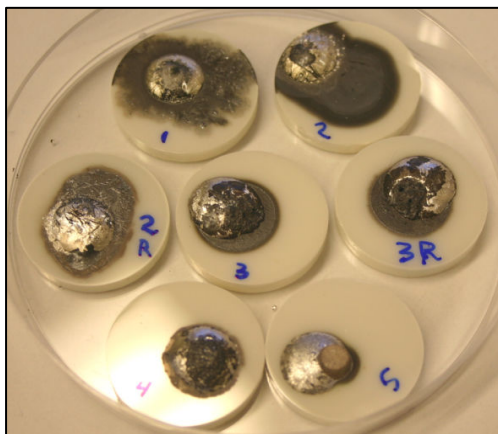
- Processing
- Scanning Electron Microscope (SEM) Characterization
- Energy-dispersive X-Ray Spectroscopy (EDS)
- Mechanical Testing (four-point bend and hermeticity testing)



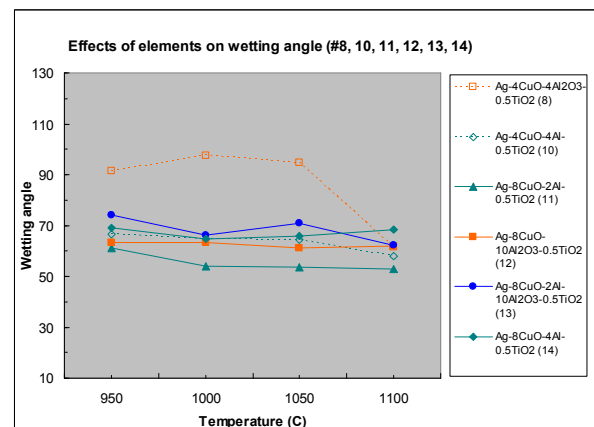
(a)



(b)



(c)



(d)

(a) Metal-ceramic-metal attachment, (b) Ceramic-metal-ceramic attachment,  
 (c) Wetting experiments used to characterize reactive air brazing, (d) Wetting angle as a function of temperature

#### CONTACT

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