

# sCO<sub>2</sub> Round Robin Overview



**Julie Tucker**  
*Oregon State University*

sCO<sub>2</sub> HX Workshop – 10/15/2015  
Laboratory Materials Research Panel

# Overview

## 2015-2018 DOE NEUP Award

- ∞ Oct. 1 2015 start date
- ∞ Develop a sCO<sub>2</sub> materials working group
- ∞ Round robin testing
  - 6 teams
- ∞ Comparison of sCO<sub>2</sub> to SCW data
- ∞ Joint testing in sCO<sub>2</sub>
- ∞ Model alloy testing and modeling

# Round Robin Goals & Objectives

- ∞ Validation of sCO<sub>2</sub> corrosion test systems
- ∞ Demonstrate comparable and reproducible results
- ∞ Test 4-5 alloys at 2 temperatures
- ∞ Perform characterization of alloys
- ∞ Publish findings

# Round Robin Milestones

Milestones	Year 1				Year 2			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Kick off meeting								
Development testing procedures								
Acquisition and dispersal of test samples								
Develop post-test characterization methodology								
sCO2 exposure								
Corrosion sample analysis								
Status update meeting report								

# Round Robin Team Members

## Round Robin Testing

- ☞ Oregon State University: Julie Tucker (Lead-PI)
- ☞ University of Wisconsin-Madison: Mark Anderson
- ☞ Oak Ridge National Laboratory: Bruce Pint
- ☞ National Energy Technology Laboratory: Omer Dogan
- ☞ Carleton University: Henry Saari
- ☞ Korea Advanced Institute of Science and Technology: Changheui Jang
- ☞ CSIRO Energy Center: Rene Olivares

## Corrosion Coupon Support

- ☞ Electric Power Research Institute: Steven Kung & John Shingledecker

# Round Robin Capabilities

Organization	Maximum Temperature	Maximum Pressure	Chamber Volume	Flow rate (mL/min)	Autoclave Material
OSU	800°C	26 MPa	1235 cm <sup>3</sup>	0-24	Haynes 230
UW (2 systems)	750°C	25 MPa	900 cm <sup>3</sup>	0-24	Inconel 625
	760°C	38 MPa	(combined)	0-24	Haynes 282
ORNL	850°C	30 MPa	1400 cm <sup>3</sup>	0-24	Haynes 282
NETL	800°C	28 MPa	1040 cm <sup>3</sup>	0-24	Haynes 230
Carleton	750°C	25 MPa	1150 cm <sup>3</sup>	0-250	Inconel 625
KAIST (2 systems)	700°C	25 MPa	1077 cm <sup>3</sup>	0-24	Inconel 625
			(each)		
CSIRO	1000°C	25 MPa	68 cm <sup>3</sup>		Variable Tube

# Testing Parameters

- Environment: Research grade CO<sub>2</sub> (99.999% pure)
- Time of Exposure: up to 1500 hrs
- Temperatures: 550°C and 700°C
- Pressure: 20 MPa
- Flowrate: Refresh chamber every 2 hours
- Testing 5 alloys
  - 740H (700°C only)
  - 625
  - 316
  - HR120
  - Grade 91 (550°C only)



# Next Meetings

## ∞ Supercritical CO<sub>2</sub> Power Cycles Symposium

- March 29–31, 2016, San Antonio, TX

## ∞ MS&T

- October 23-27 2016, Salt Lake City, UT, USA
- Symposium on sCO<sub>2</sub> corrosion