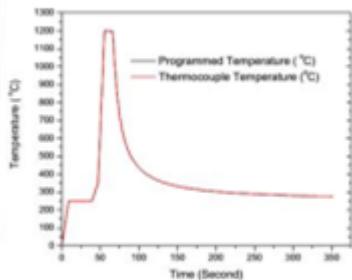


Experiments using Gleble 3800 system



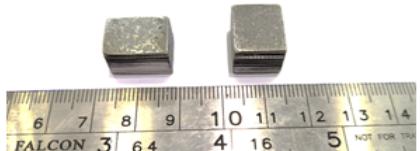
HAZ Experiment

CO N T A C T

<http://www.ipr.res.in/httd/index.html>
Ph-No: +91-79-2396 2073
Fax.No: +91-79-2396 2277
E-mail id: technology@ipr.res.in

Experiments using Gleble 3800 system

TUNGSTEN LAMINATE SAMPLE FABRICATION

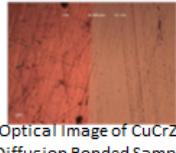


- » Tungsten laminates produced via diffusion bonding route using Gleble 3800 system.
- » Tungsten laminate samples of size 15mm (l) x 10mm (b) x 3mm to 15mm (t) are fabricated.

DIFFUSION BONDING & BRAZING STUDIES



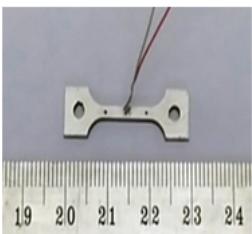
CuCrZr Diffusion Bonded Sample



Optical Image of CuCrZr Diffusion Bonded Sample

- » Diffusion bonding and brazing studies for joining of similar or dis-similar materials can be performed using Gleble 3800 system.
- » Sample Size used: Rectangle sample of size 8mm-15mm(l)X8mm-15mm(w)X3mm-10mm(t).

SMALL SPECIMEN TENSILE TEST TECHNIQUE



- » Dimensions of Test Specimen
- (a) Overall length: 30mm
- (b) Gauge length: 10mm
- (c) Thickness: 1.5 to 2mm
- » Test Temperature: 200°C to 1700°C
- » Test environment: Vacuum or inert gas environment

SHEAR PUNCH TEST TECHNIQUE



- » Dimensions of Test Specimen: 8mm (dia.) x 0.5mm (t)
- » Test Temperature: RT to 500°C
- » Test environment: Vacuum or inert gas environment

Gleble 3800

A Thermo-mechanical Simulator System



High Temperature Technologies Division



Institute for Plasma Research
Bhat, Gandhinagar, Gujarat,
India-382428
www.ipr.res.in

Technical Specifications

Thermal System	
Type of heating system	Direct resistance with closed-loop control
Temperature control	Digital closed-loop control using 16 bit analog-to-digital converter and 16/32 bit digital signal processor
Temperature range	Room temperature to 2300°C
Accuracy of temperature control	± 1°C (in steady state)
Number of thermal channels	4 thermocouple channels, or 3 thermocouple channels and one pyrometer channel
Maximum Heating Rate	10,000°C/sec (for 6 mm diameter tensile specimen with 10 mm free span.)
Mechanical System	
Test frame	Horizontal type with dual 99 mm diameter columns
Mechanical system	Closed-loop hydraulic servo control
Maximum force in compression	196kN
Maximum force in tension	98kN
Maximum stroke rate	2000mm/sec in tension or compression
Minimum stroke rate	0.001mm/sec in tension or compression
Maximum stroke distance	125mm
Specimen Sizes	
Minimum specimen size required	5mm in diameter for round specimen 5mm square
Maximum specimen size allowed	20mm in diameter for round specimen 20mm square for square specimen

Application of Gleeble 3800 system

Material Testing

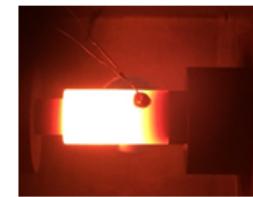
- High temperature tensile tests
- High temperature compression tests
- Hot ductility testing
- Nil Strength Tests
- Thermal fatigue tests
- Thermal-mechanical fatigue
- Creep test

Process simulation

- Melting solidification studies
- Continuous casting simulations
- Hot rolling simulations
- Forging simulation
- Weld HAZ cycle simulation
- Diffusion bonding
- Brazing
- Powder metallurgy/sintering
- Phase transformation
- Heat treating
- Quenching

Experiments using Gleeble 3800 system

POWDER MATERIAL SINTERING



Sintering Experiment



Tungsten Sintered Pellet

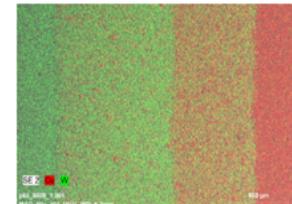
Powder materials can be sintered using Gleeble 3800 system at parameters listed below.

- » Pallet Size: 10mm to 15m diameter and 3 to 7mm thick
- » Temperature: 100°C to 1900°C
- » Pressure: 3MPa to 40MPa
- » Environment: 10⁻³ Torr vacuum or insert gas like Argon, Nitrogen, etc.

TUNGSTEN-COPPER FGM SAMPLE FABRICATION



W/Cu FGM 70/30 Cross Section



W/Cu FGM 70/30 Elemental mapping

» Tungsten(W)-Copper(Cu) FGM produced via Sintering route using Gleeble 3800 system.

» 80%W-20%Cu, 70%W-30%Cu and 50%W-50%Cu grades of FGM samples are fabricated.

» Sample size: 15mm (dia.) x 3mm to 6mm (t)