TRP Materials Research Activities

Ajit Roy, Ph.D.
Associate Research Professor
Department of Mechanical Engineering
University of Nevada, Las Vegas (UNLV)

Advanced Fuel Cycle Initiative
Semi-Annual Review Meeting

Santa Fe, NM
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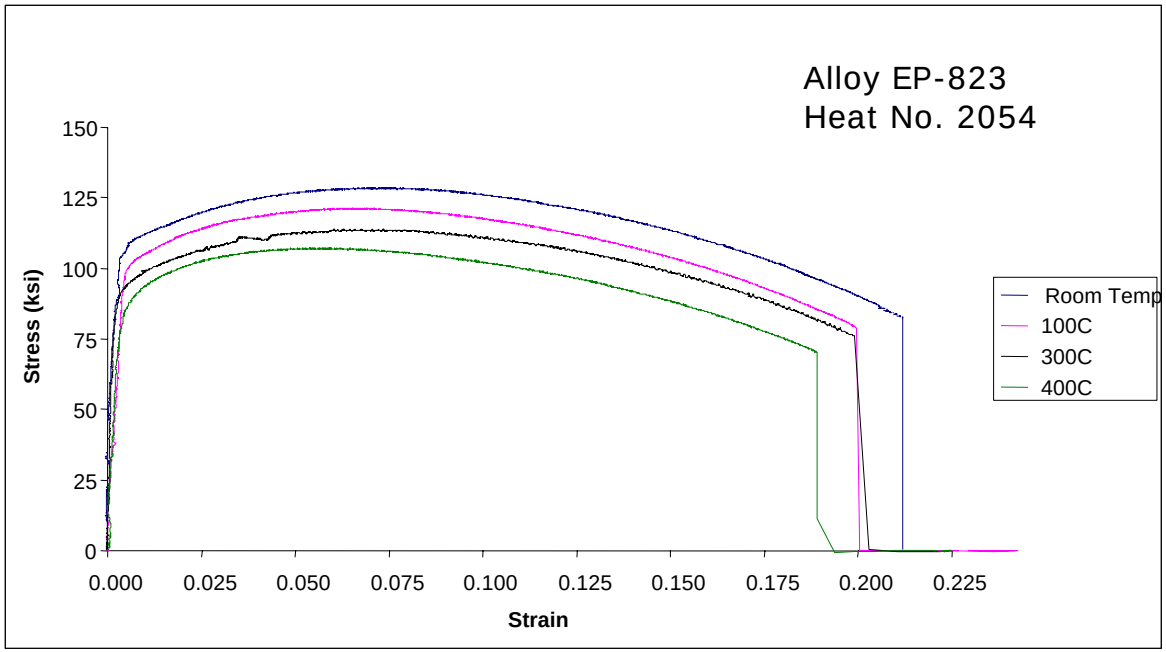
UNLV Materials Research Capabilities

- Elevated Temperature Mechanical Testing in Inert Environment
- Ambient and Elevated Temperature Aqueous Corrosion Testing
- Electrochemical Testing
- Heat-treatment Facility
- Optical Microscopy for Microstructural Analyses
- Scanning Electron Microscopy
- Transmission Electron Microscopy

High-Temperature Tensile Testing

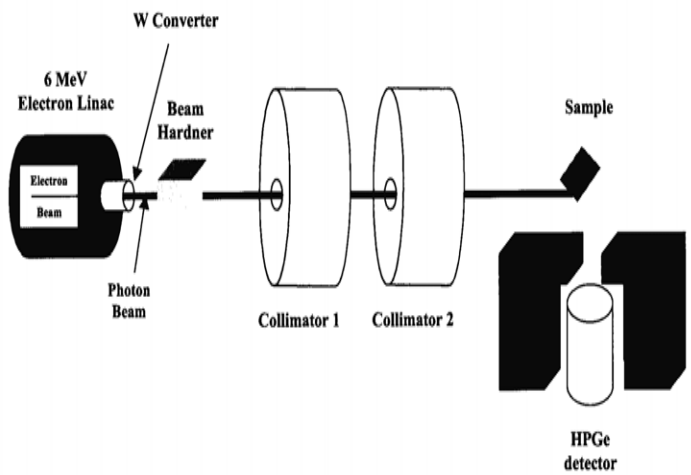


Stress-Strain Diagram as a function of Temperature

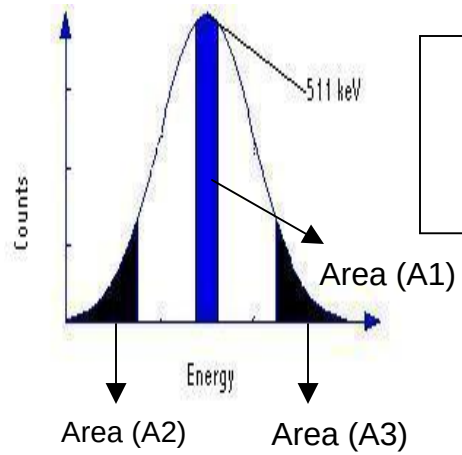
Temperature (˚C)	UTS (ksi)	YS (ksi)	%El	%RA
Room Temperature	128.6	108.7	22.00	63.00
100	121.3	102.1	19.95	63.81
300	113.9	91.9	19.91	63.64
400	107.3	86.8	18.90	63.98

Mechanical Properties of Alloy EP-823 at Different Temperatures

Positron Annihilation Spectroscopy for Residual Stress Measurement



Experimental Setup



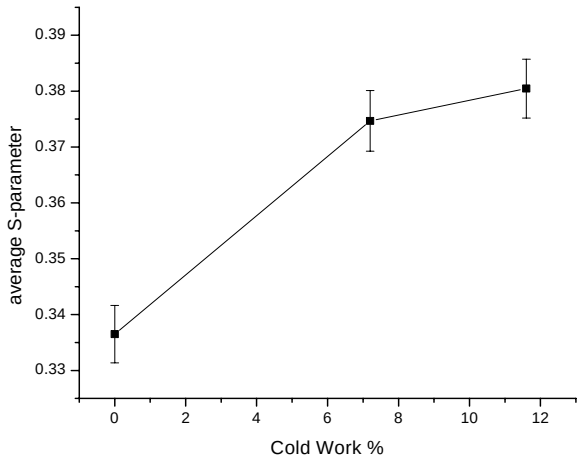
S-Parameter = A1/A

W-Parameter = (A2+A3)/A

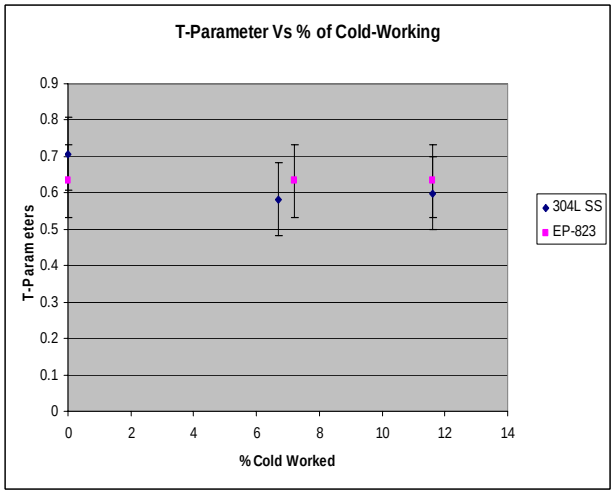
T-Parameter = W/S

A = A1+A2+A3

Characteristics of a 511 KeV Curve

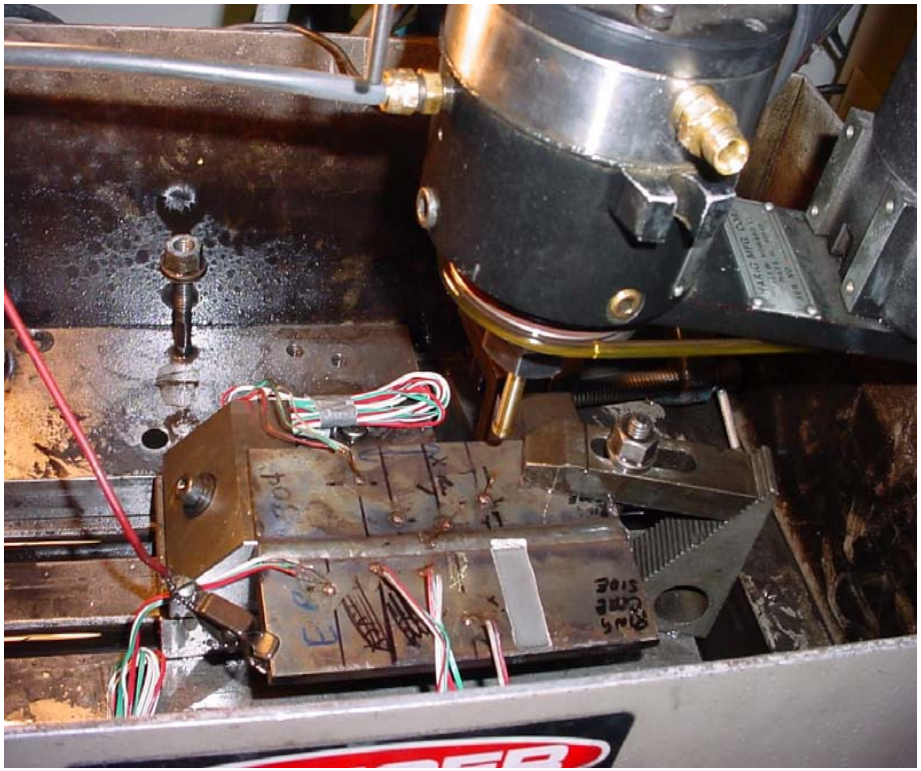


S-Parameter vs % Cold-Working

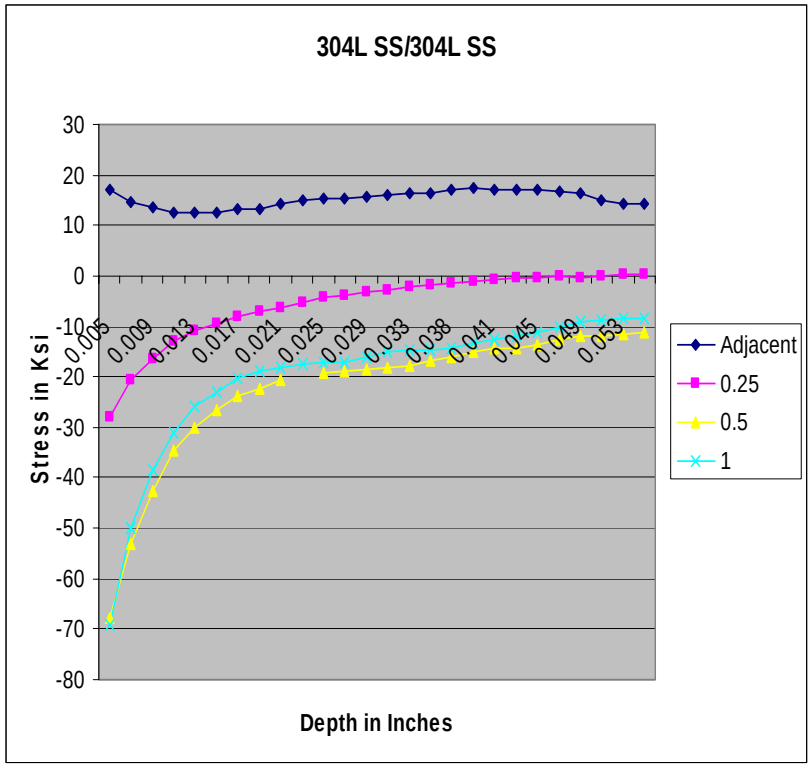


T-Parameter vs % Cold-Working

Ring-Core Method for Residual Stress Measurement

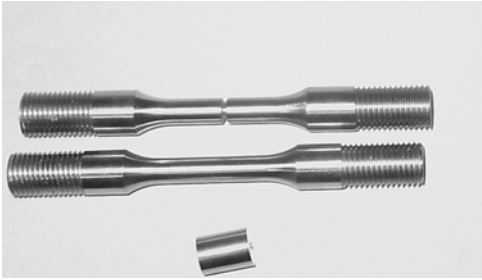


Experimental Setup

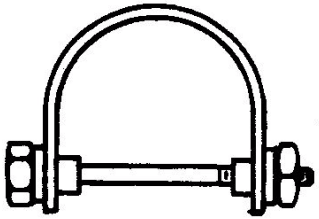


Residual Stress vs Depth

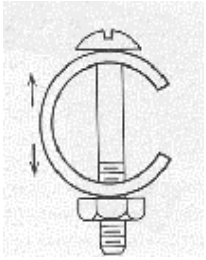
SCC Testing



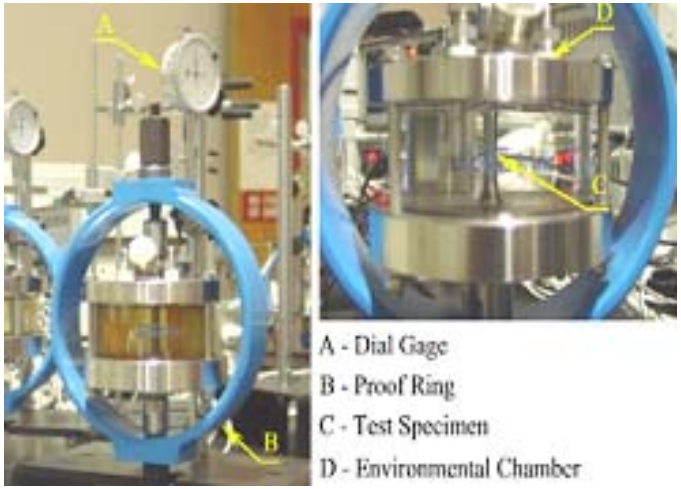
Tensile and Polarization Specimens



U-Bend Specimen



C-Ring Specimen

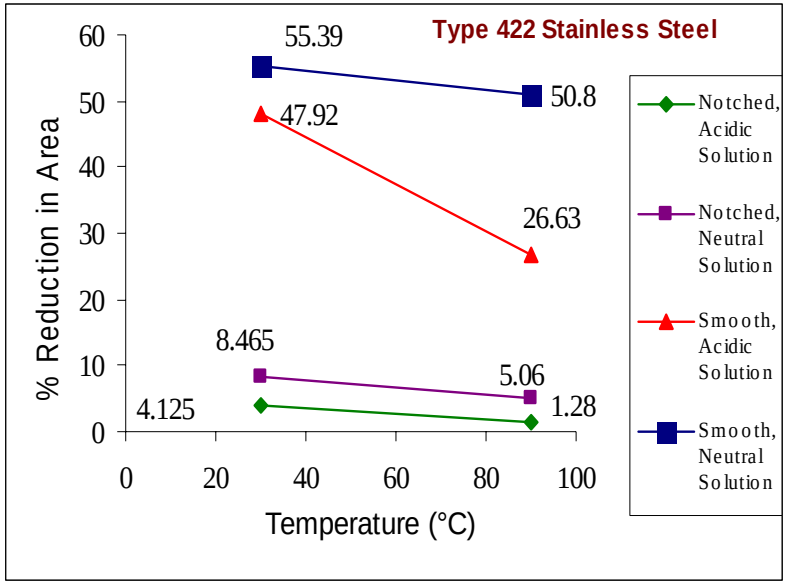


Constant-Load Test

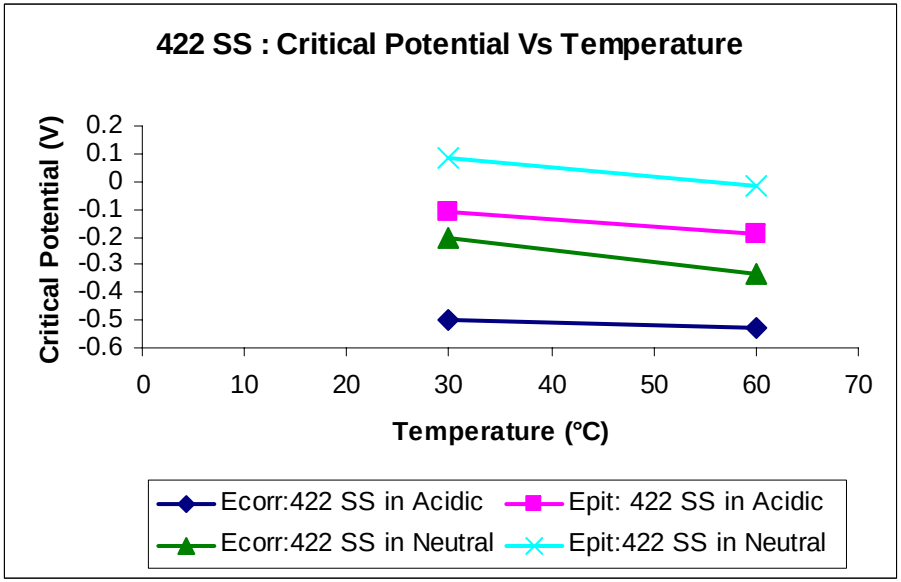
Slow-Strain-Rate Test

Electrochemical Test

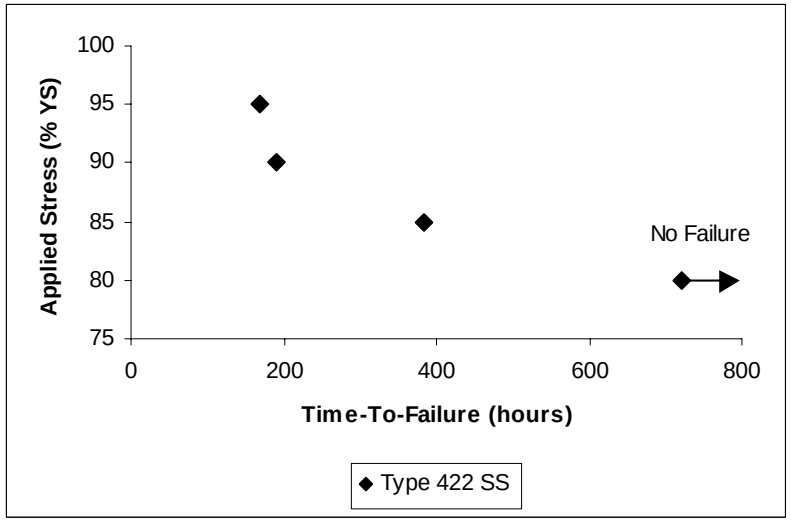
Results



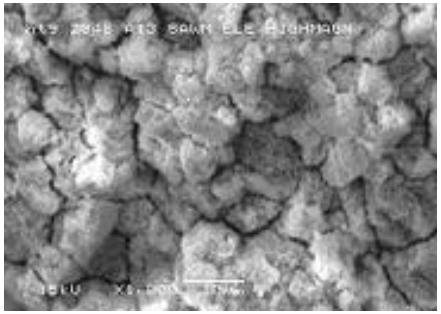
SSR Data



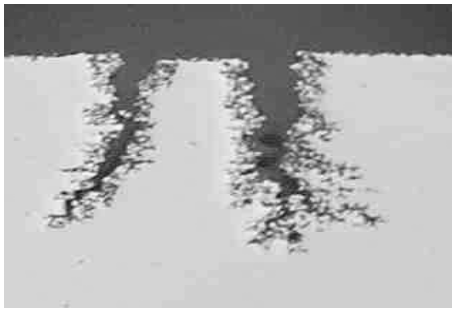
CPP Data



Constant Load Data in 90°C Acidic Environment



SEM Micrograph (Alloy HT-9, Acidic, 90°C, at 1000X)



Optical Micrograph (Type 422 SS, Acidic, 90°C, at 40X, As Polished)