

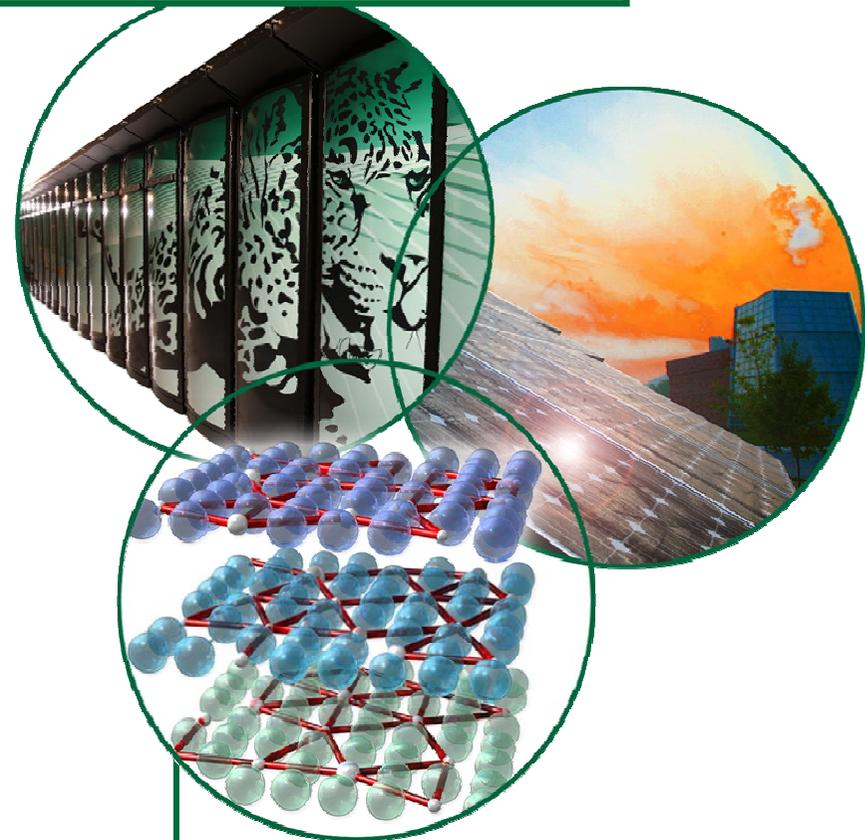
Improving the Performance of Creep-Strength-Enhanced Ferritic Steels

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US-UK Collaboration on Energy RTD

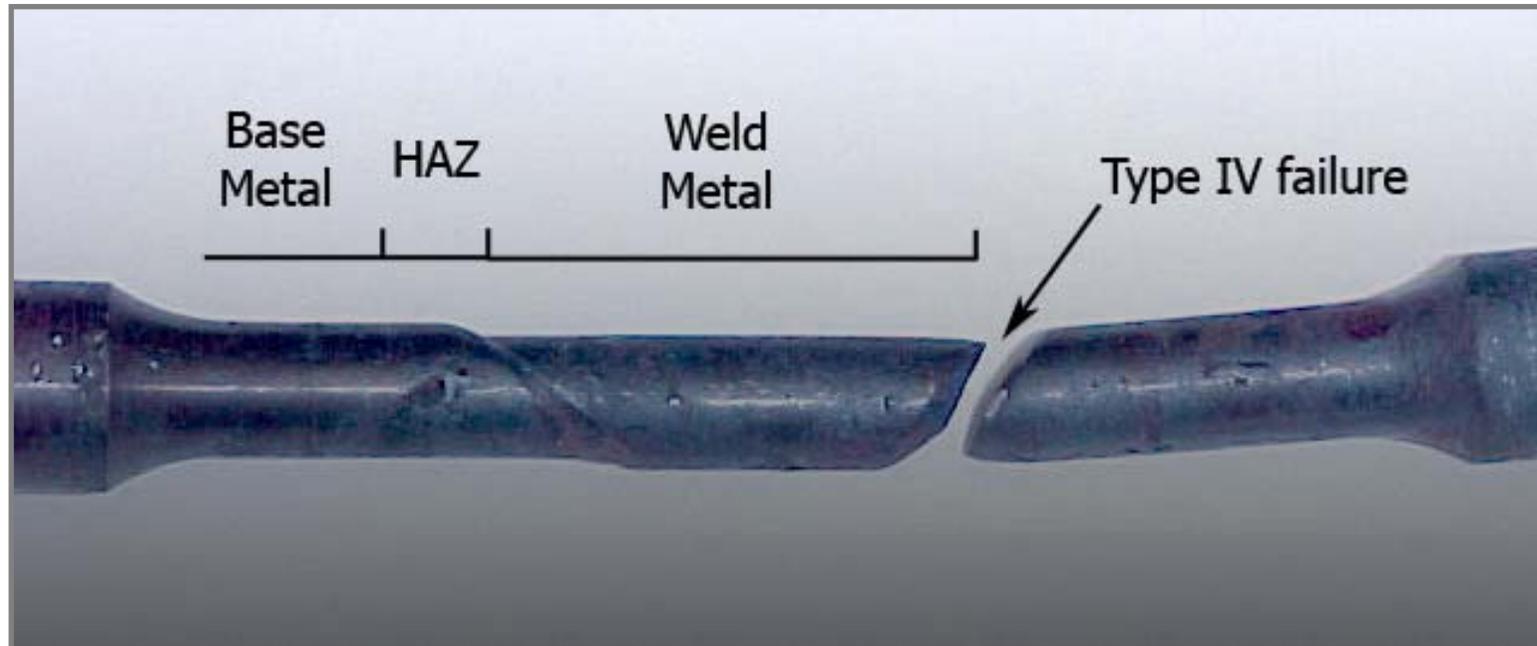
Pittsburgh, PA



Purpose is to build fundamental understanding needed to maximize performance of CSEF steels

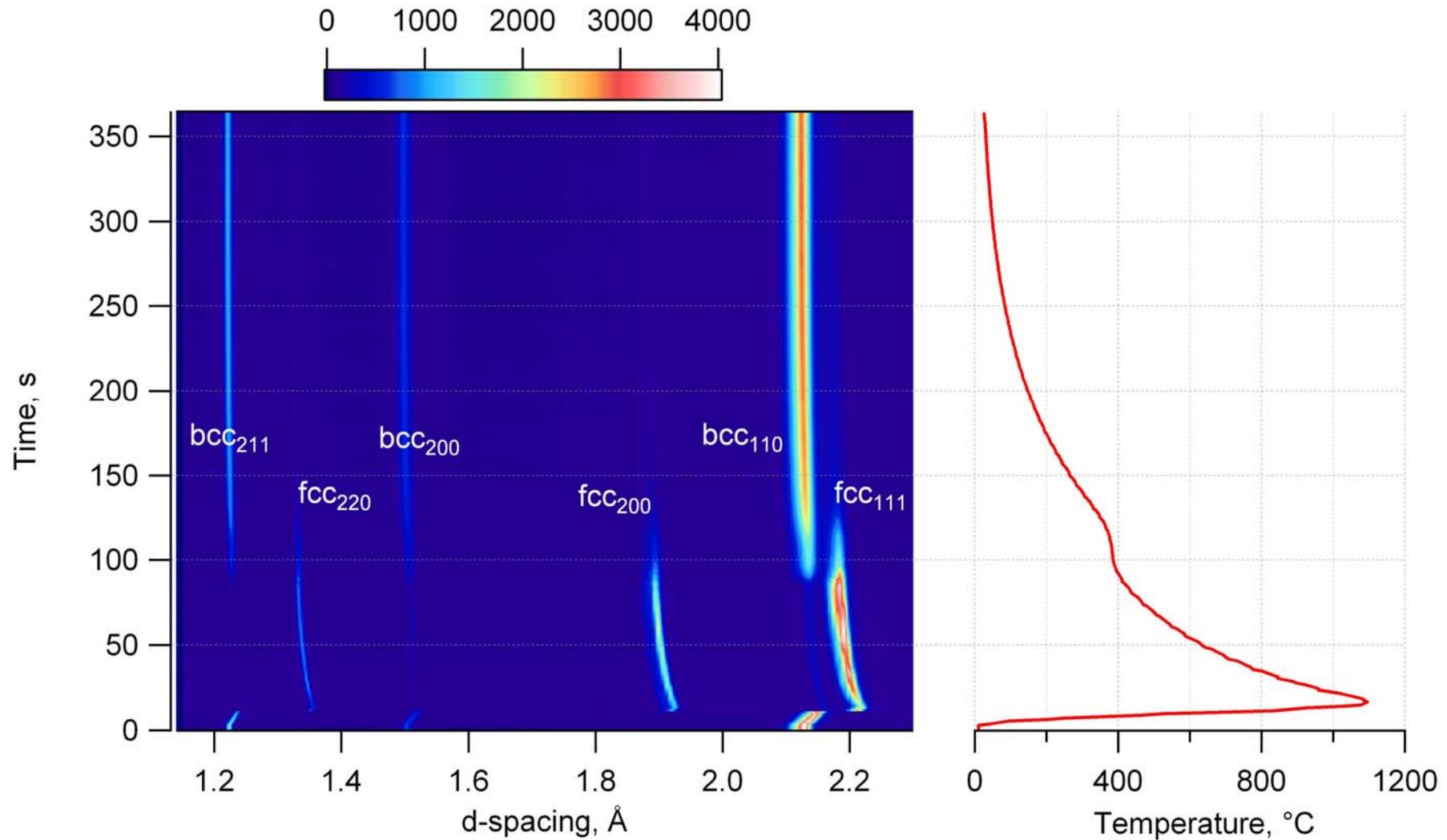
- Activities combine basic & applied R&D with strong power industry interactions
- Specific goals include:
 - Improving the structural performance of creep-strength-enhanced ferritic steels (9-12Cr-Mo steels)
 - Provide science-based guidelines for maximizing safe operating temperatures
 - Understand the fundamental causes of current temperature limitations
 - Causes of Type IV failures
 - Possible ways of minimizing/eliminating Type IV failures
 - Develop approaches for increasing practical operating temperatures

Long-time weldment properties may not meet projections from short-time data

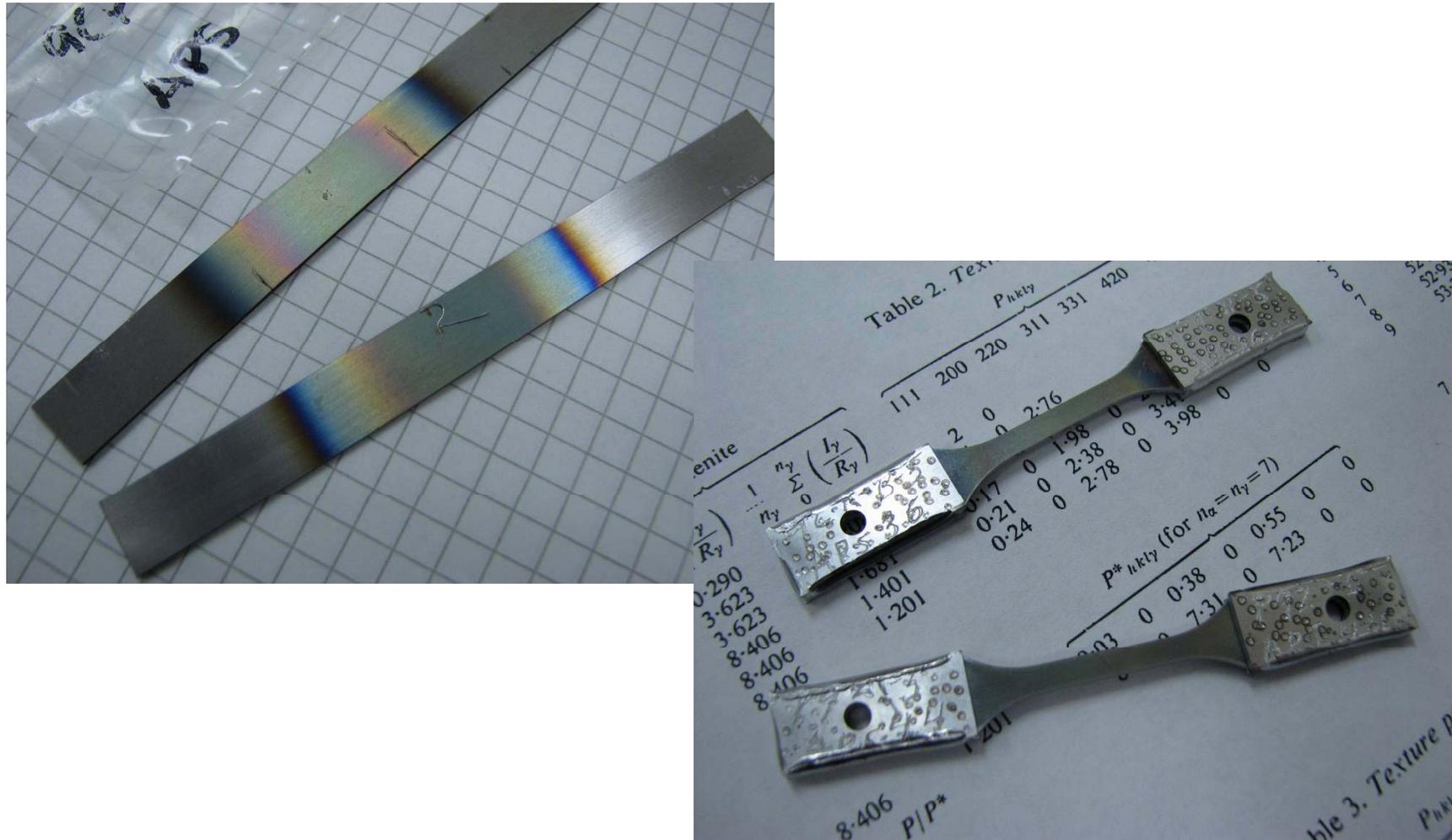


- Type IV failure of Cr-Mo steel welds is due to weakened microstructures in HAZs
- Unexpected behavior that causes unscheduled, premature utility outages

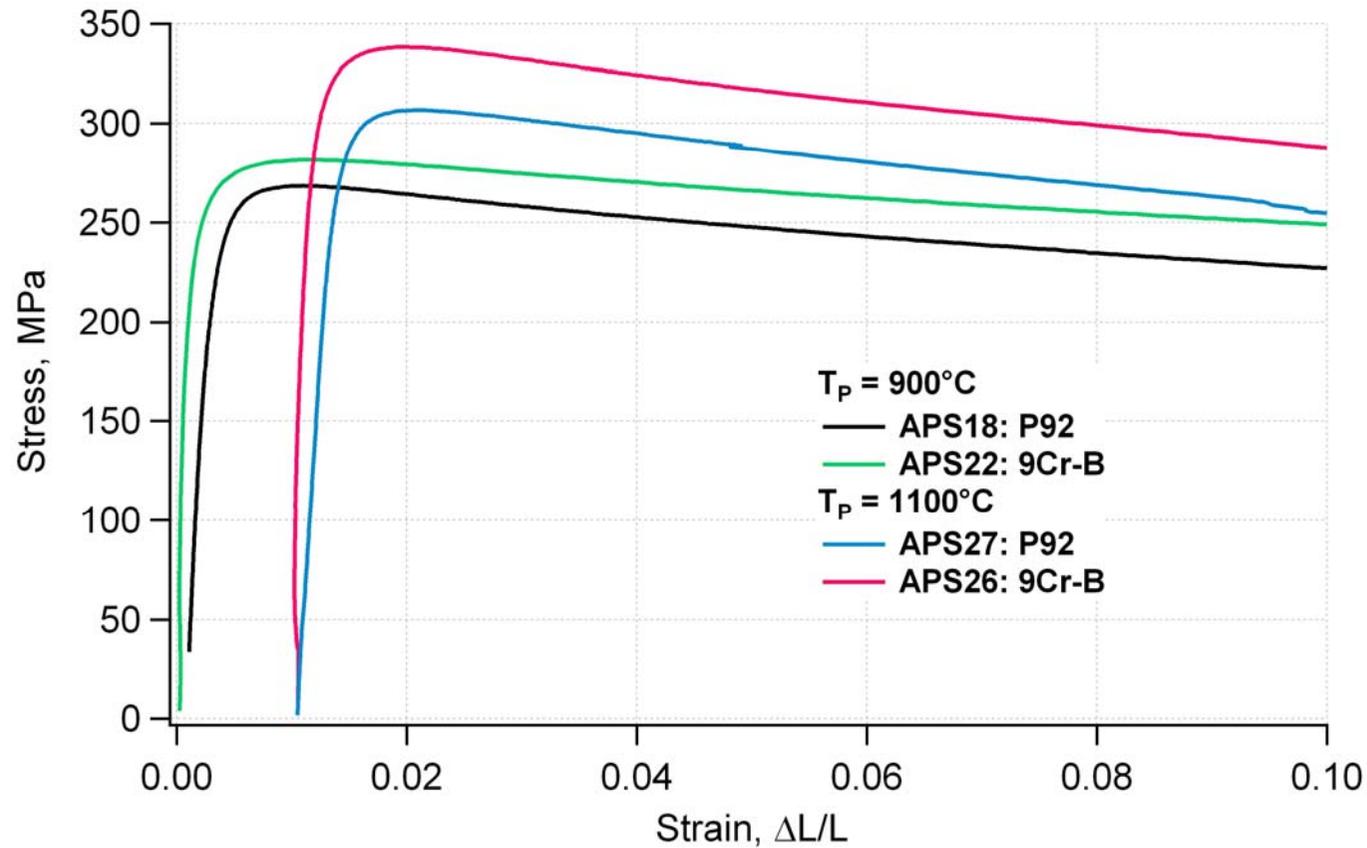
Diffraction experiments can capture the dynamics of transformation behavior



Diffraction specimens were made into tensile-creep specimens

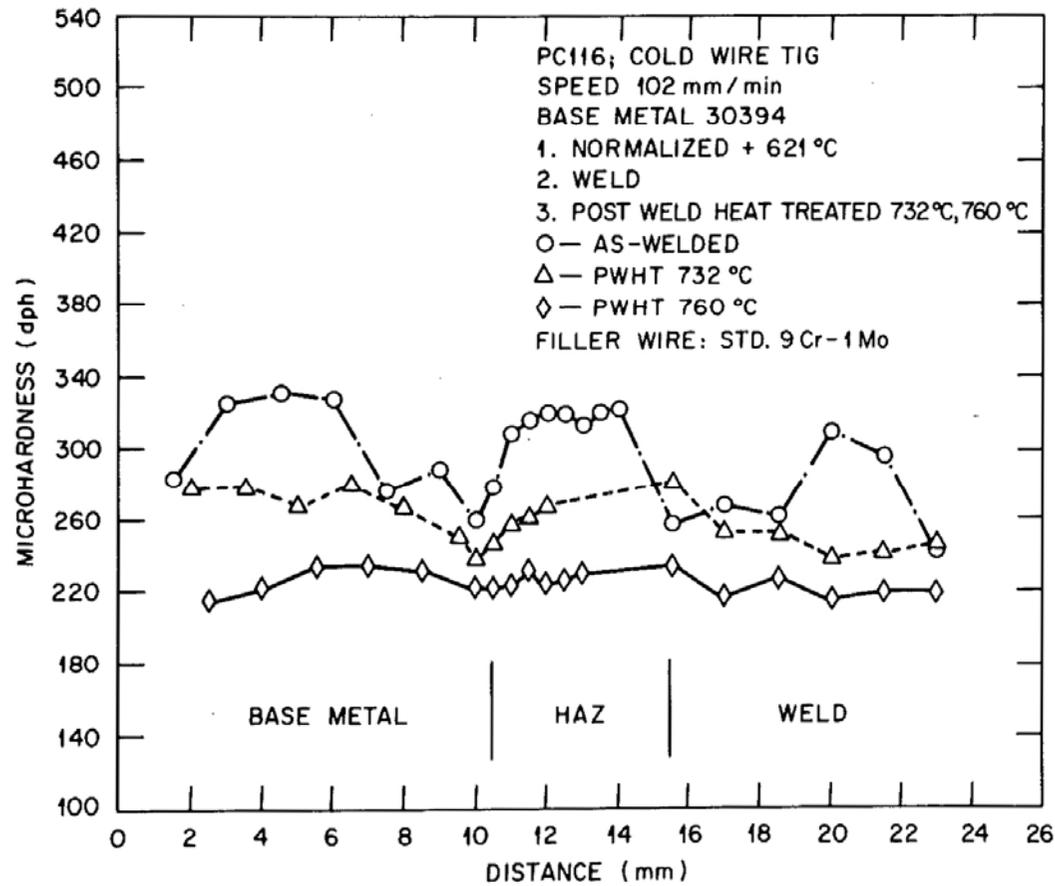


Tensile results 650°C



- Experimental steel has higher tensile strength than P92
- Creep tests are being prepared

Data from CRBR suggests modified temper- PWHT can improve resistance to Type IV



- Potential was never pursued due to closure of CRBR project
- Experiments to confirm/capitalize on behavior are in-progress