

Understanding Characterization Mechanisms of Advanced Magnesium Alloys

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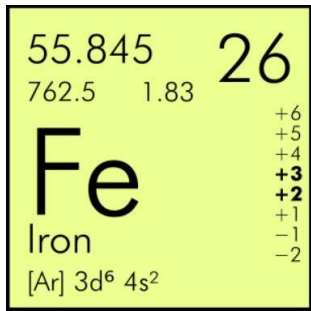
Why Magnesium?

Pros:
Abundant
Light-weight

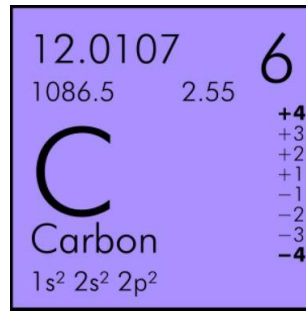


Cons:
Corrosion
Fracture





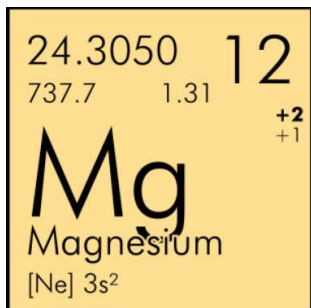
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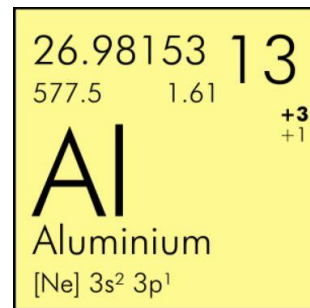
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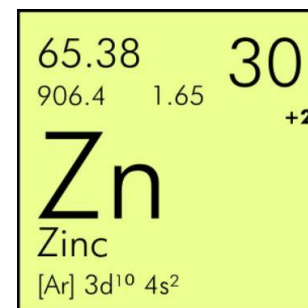
What Microscopic Mechanisms Allowed New Advanced Magnesium Alloys to be Stronger and More Ductile?



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Material Characterization



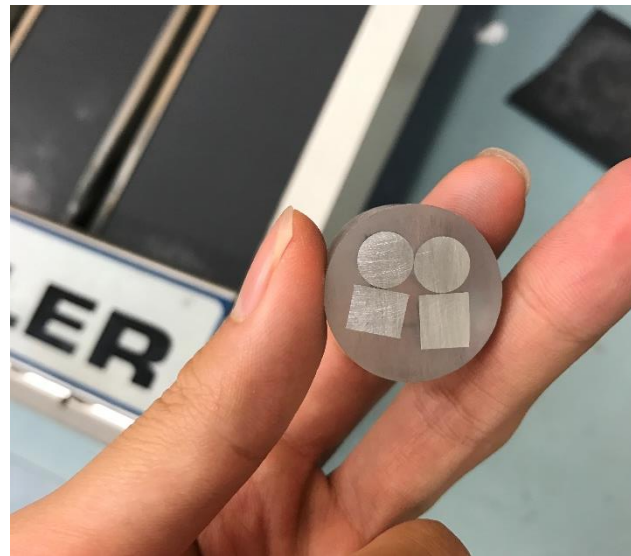
Cutting



Molding

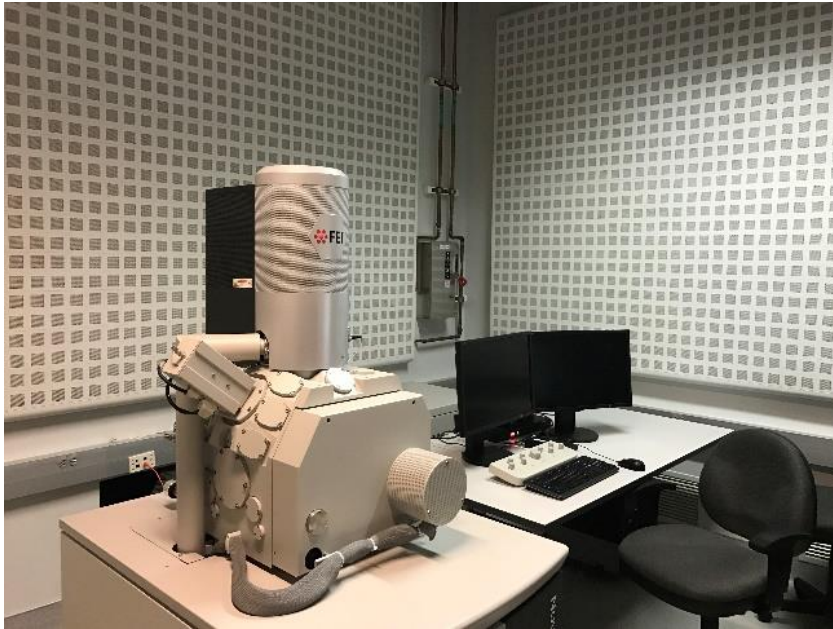


Polishing

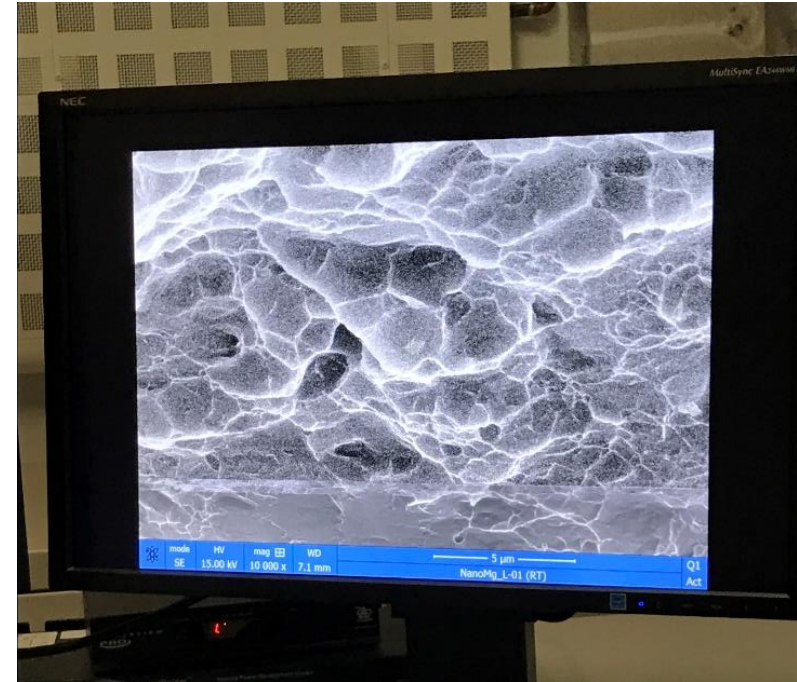


Prepared Specimen

SEM Imaging

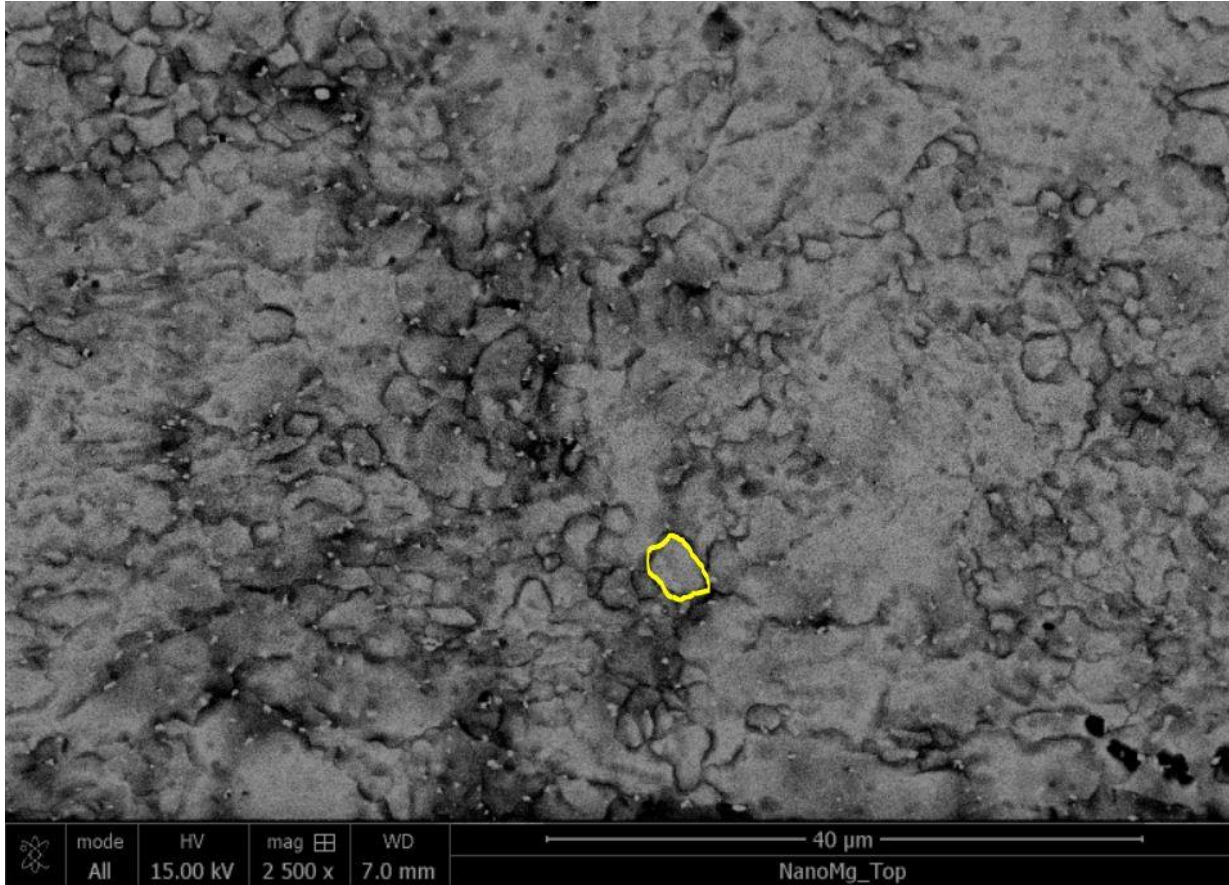


Scanning Electron Microscope (SEM)

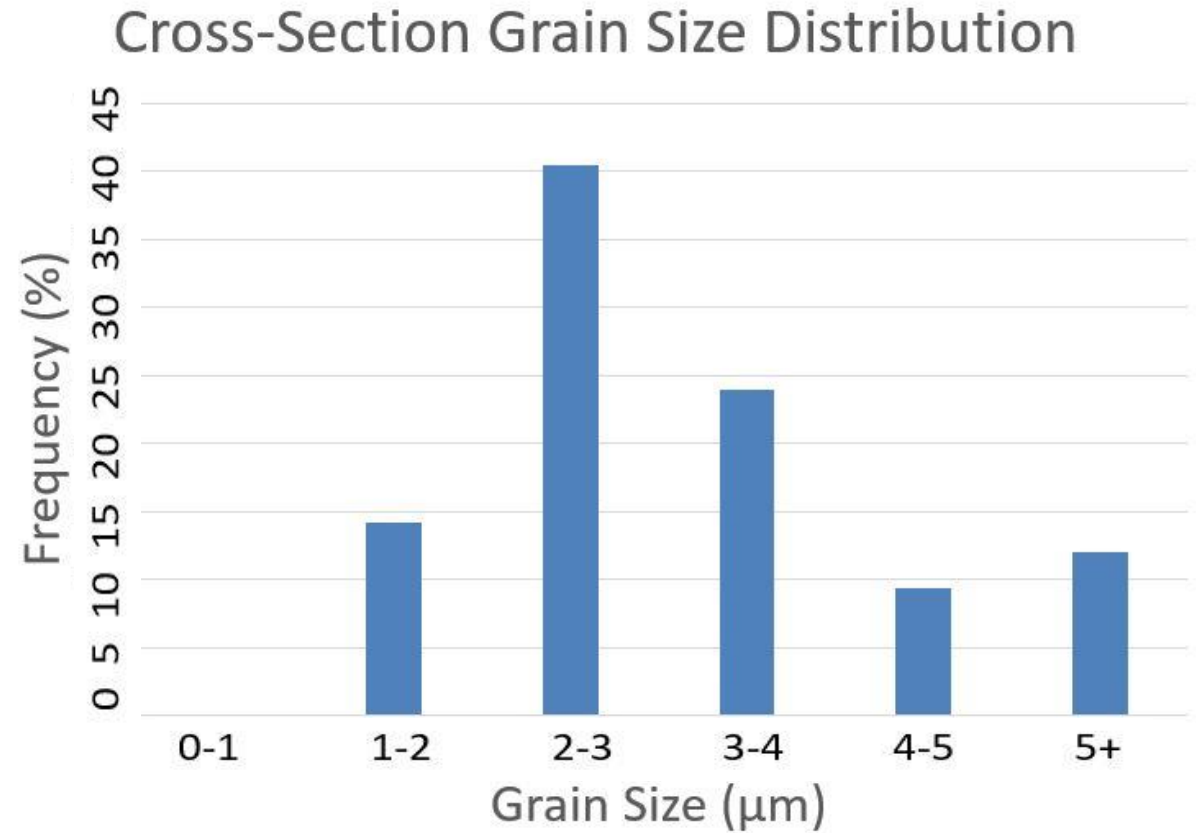


Observed Texture

Measuring Grain Size from SEM Images

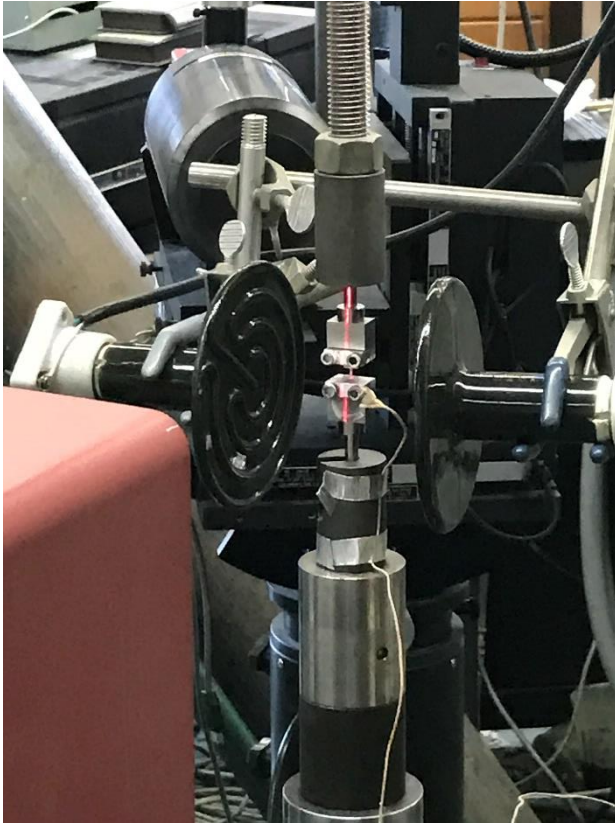


Scanning Electron Microscope Image

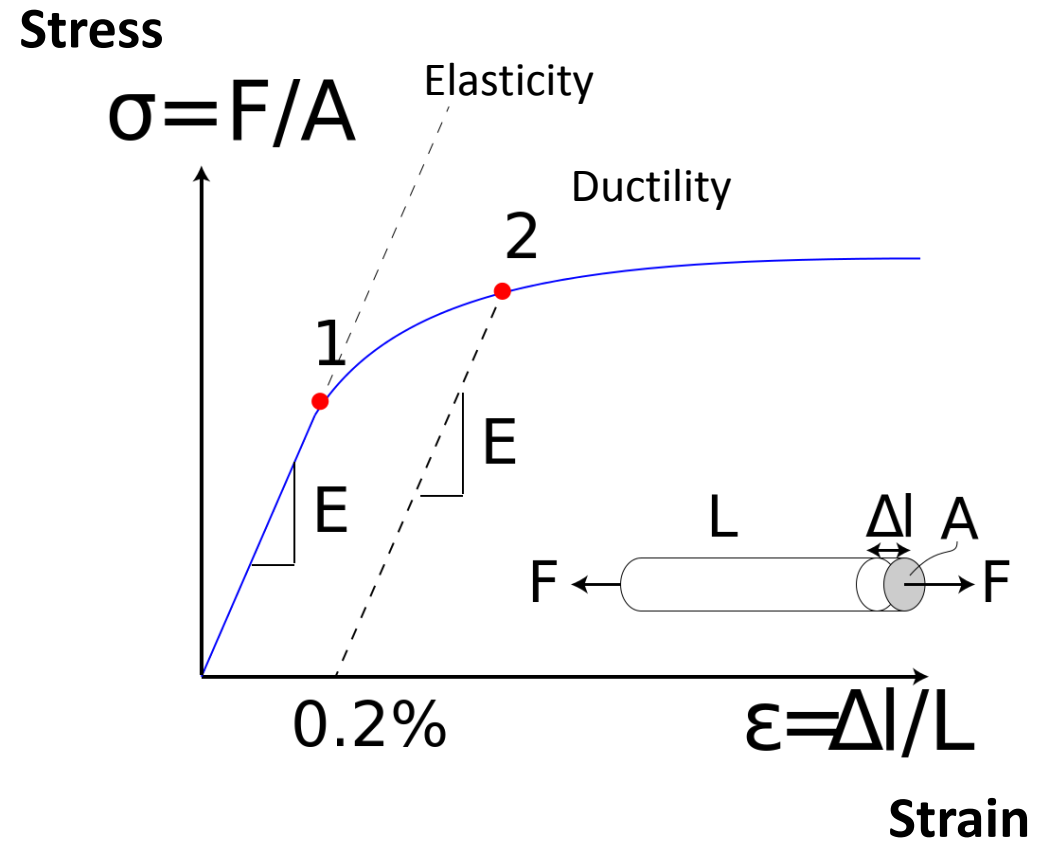


Grain Size Data of NanoMg Top Surface

Tensile Tests

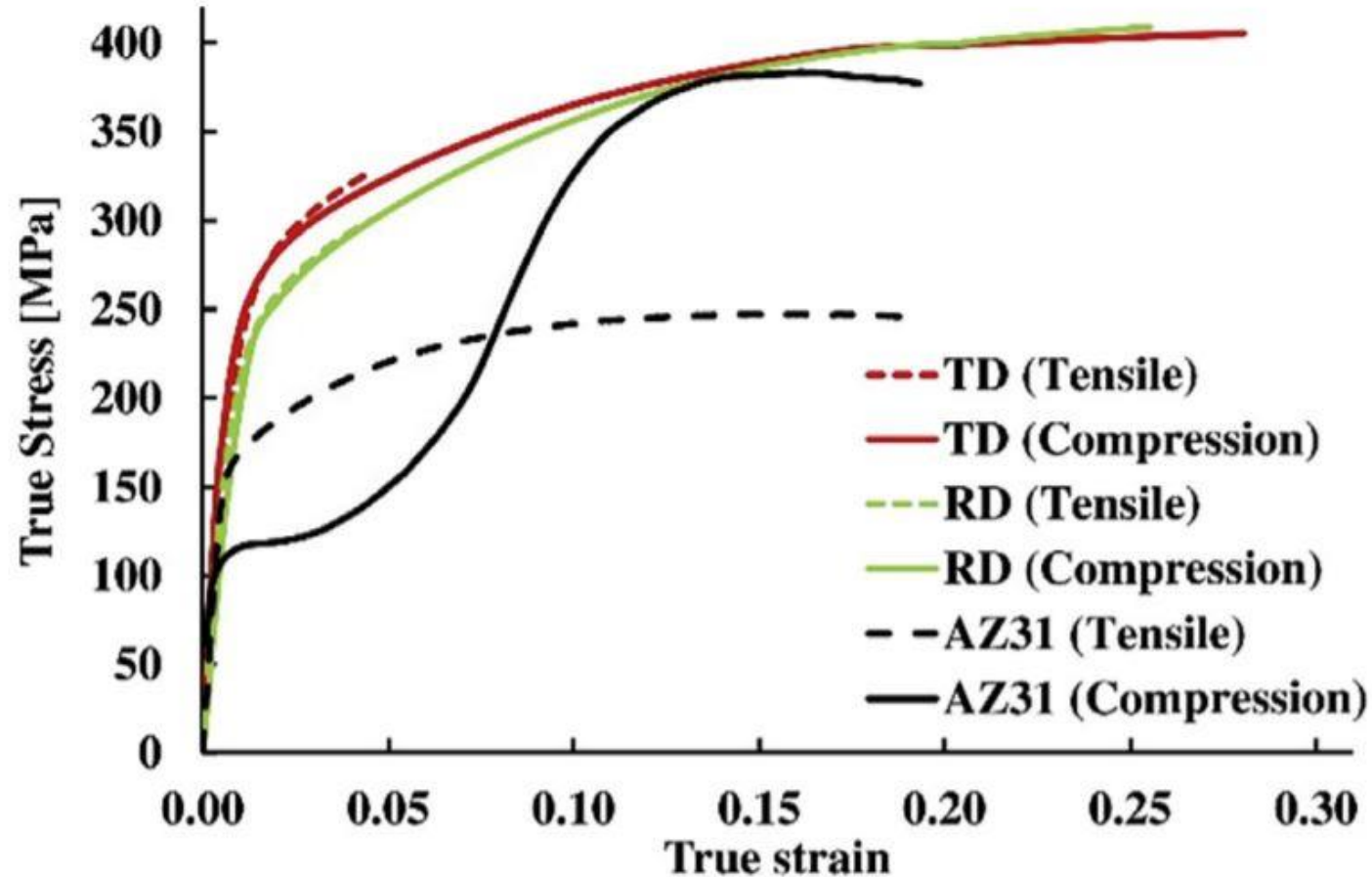


Tensile Test Machine



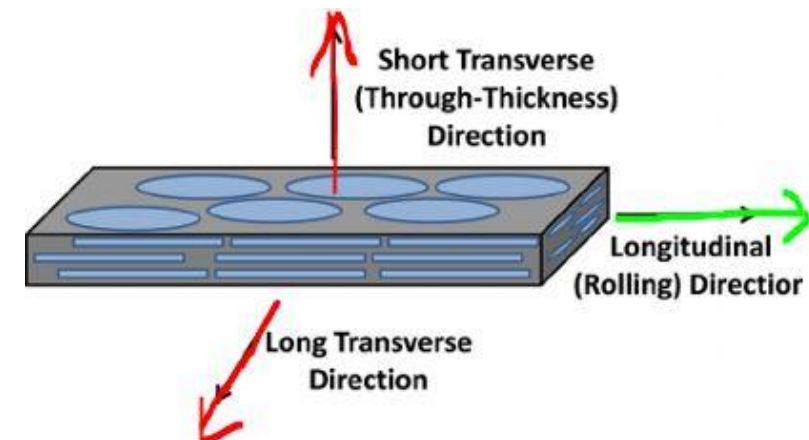
Sample Stress Strain Curve

Stress Strain Curve of WE43



Transverse Direction

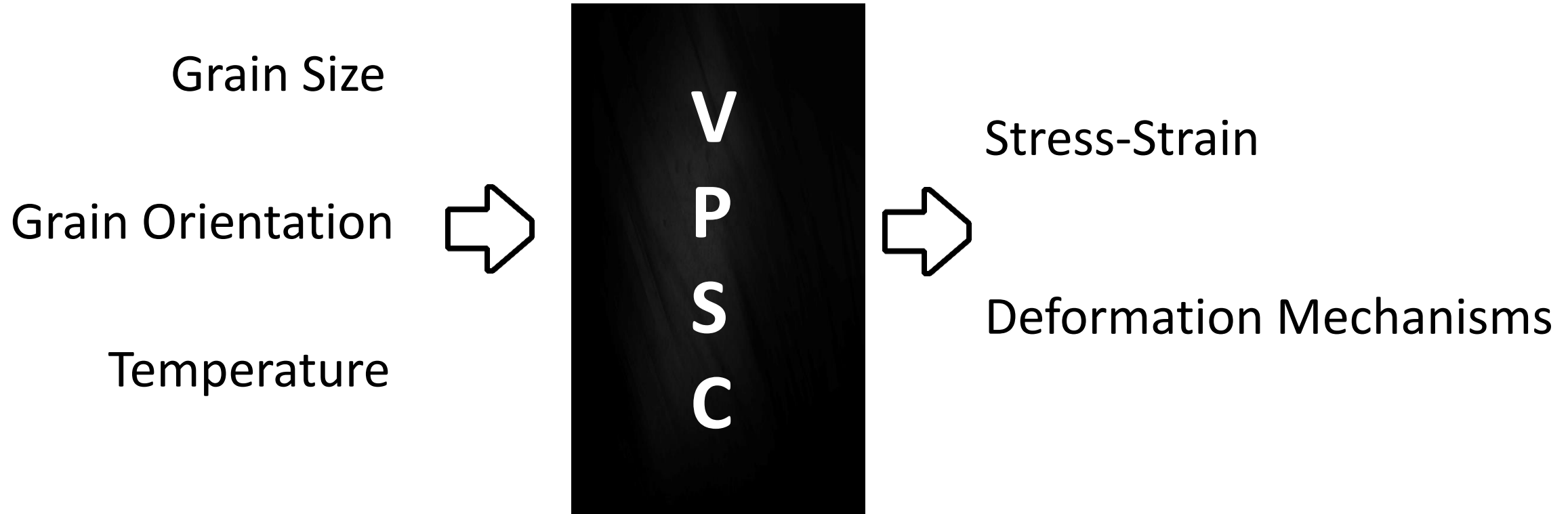
Rolling Direction



Jahedi, M., McWilliams, B. A., Moy, P. & Knezevic, M. Deformation twinning in rolled WE43-T5 rare earth magnesium alloy: Influence on strain hardening and texture evolution. *Acta Materialia* 131, 221–232 (2017).

Future Work

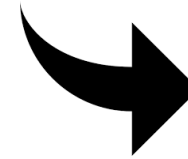
Visco-Plastic Self-Consistent (VPSC) Modeling



Understanding Current Alloys



Predicting General Behavior



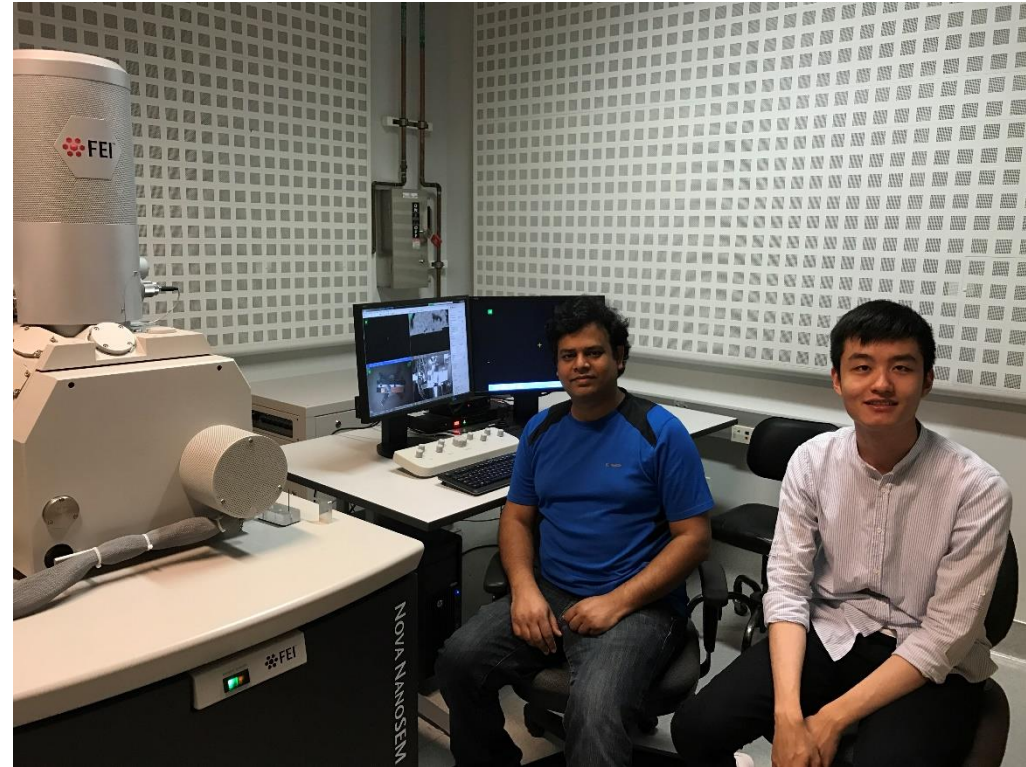
Utilize Magnesium in Industry

Thank You!

Acknowledgement



Professor Irene Beyerlein



Alam and I in Lab

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