

Collaborators

**Kunigal Shivakumar and Matthew Sharpe – Center for Composite
Materials Research**

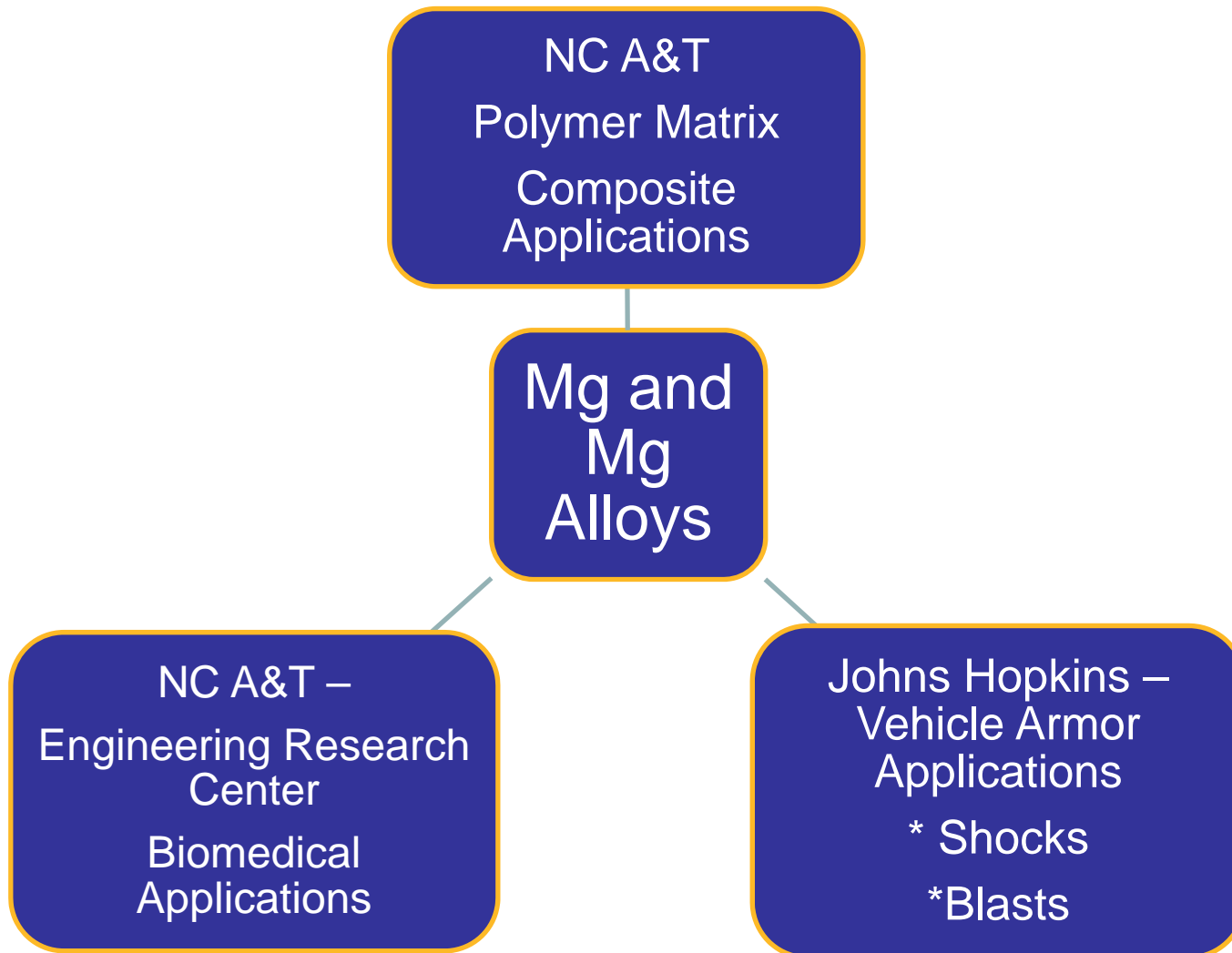
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Extreme Materials Institute**



North Carolina Agricultural and Technical State University



Research Experience





Magnesium Applications

- Automobile
- Aircraft
- Vehicle armor

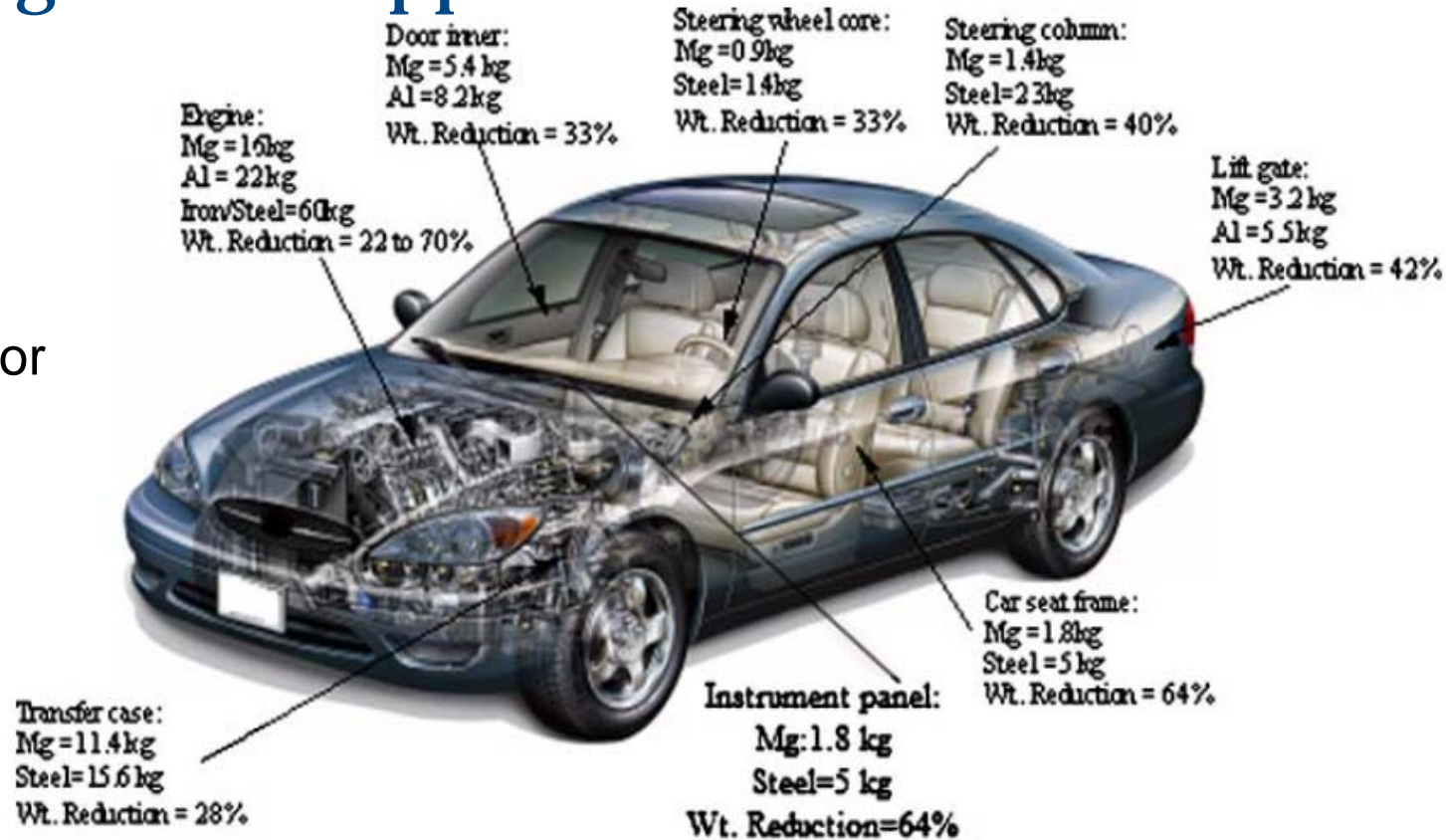


Fig. 8 Some automotive components made of Mg alloy and obtained weight reduction. N.d. Photograph. *Magnesium and Its Alloys Applications in Automotive Industry*. London: Springer-Verlag, 2007. 858. Print.



Advantages of Magnesium

- Relatively abundant – Eighth most abundant metal in the Earth's crust
- Lightest of all engineering metals (1.7 g/cm^3)
- High specific strength

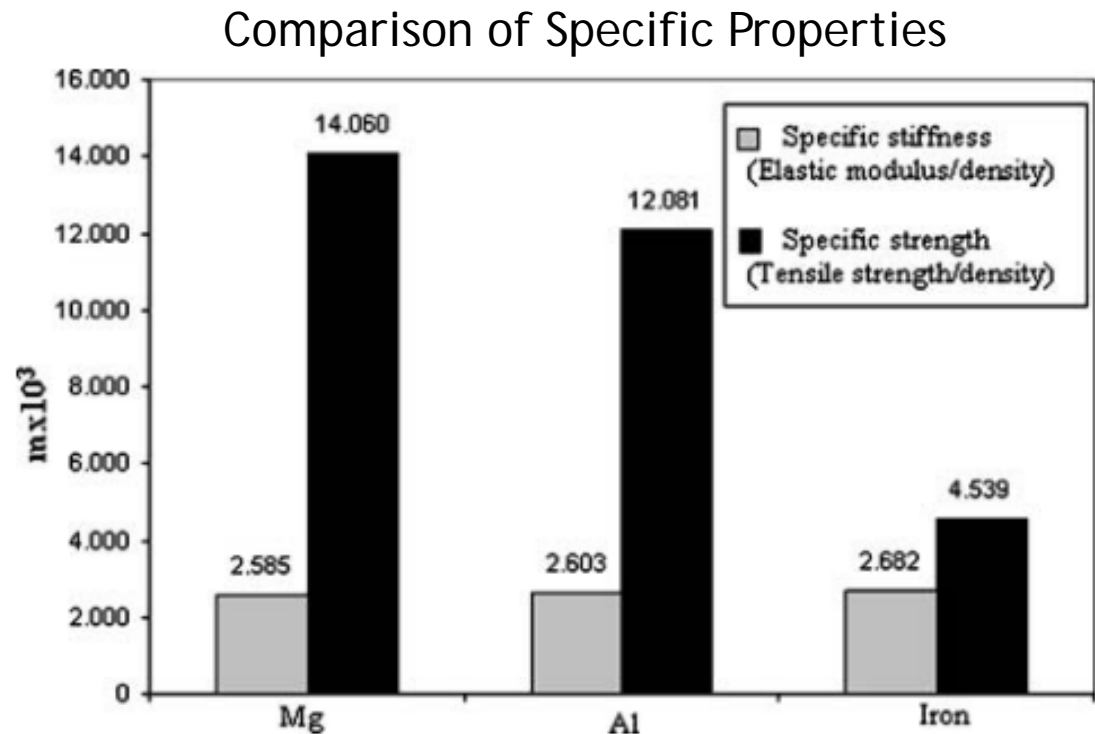


Fig. 4 Comparison of Basic Structural Properties of Magnesium with Al and Iron. N.d. Photograph. *Magnesium and Its Alloys Applications in Automotive Industry*. London: Springer-Verlag, 2007. 854. Print.

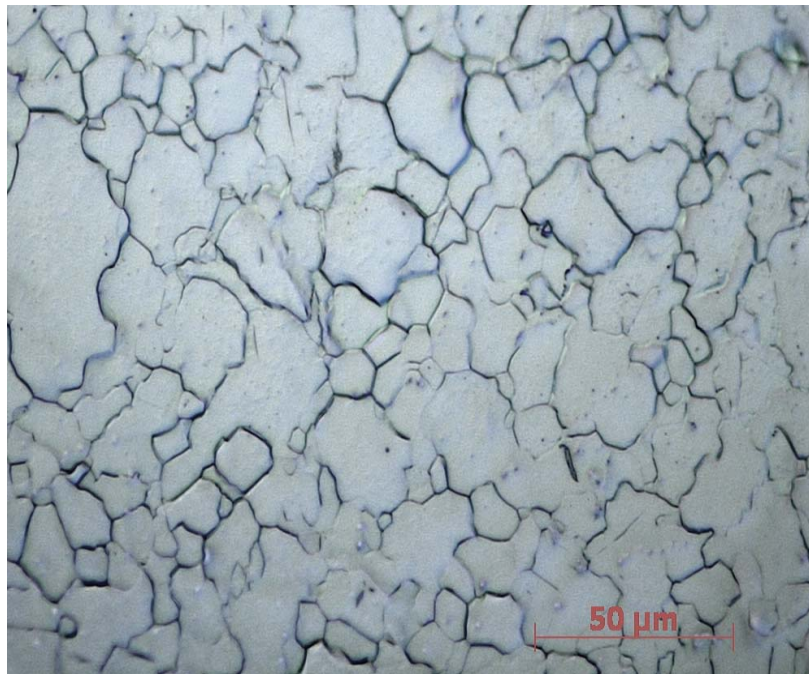


Challenges of Magnesium

- Complex deformation behavior
- Corrosion resistance
- Recyclability



At Johns Hopkins University



Grain boundaries of ECAP 3N Mg
after etching.

- Understanding microstructure of Mg (ECAP 3N Mg) and Mg alloys (ECAP AZ31)
- Polishing
- Etching
 - » 10% HNO_3 and 90% Distilled water
- Microscopy
- HEMI group at JHU conducted dynamic test to characterize materials for vehicle armor applications



Summary



- At NC A&T we are making comparative studies of Mg and Mg alloys, as well as carbon and glass composites for transportation and vehicle armor applications.



U.S. AIR FORCE