# BIOGRAPHY

- President and CEO of CorePower Magnetics
  - Commercializing novel inductor, transformer, and motor technology based on nanocrystalline alloys

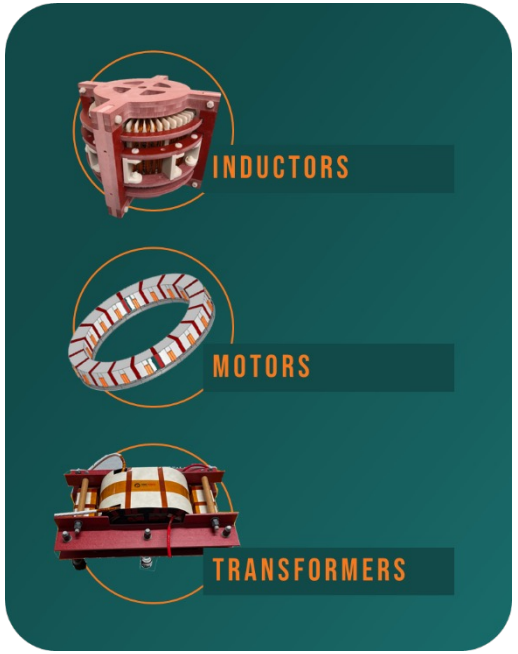
- Prior industry experience
  - Designed and led teams developing new alloys in austenitic stainless steels, Ni-base alloys, and soft magnetics
  - Led Product Engineering and Product Compliance groups for the $2B specialty alloy business unit. Accountable for engineering and continuous improvement for 15,000 SKUs serving 7 markets including aerospace, transportation, and energy.

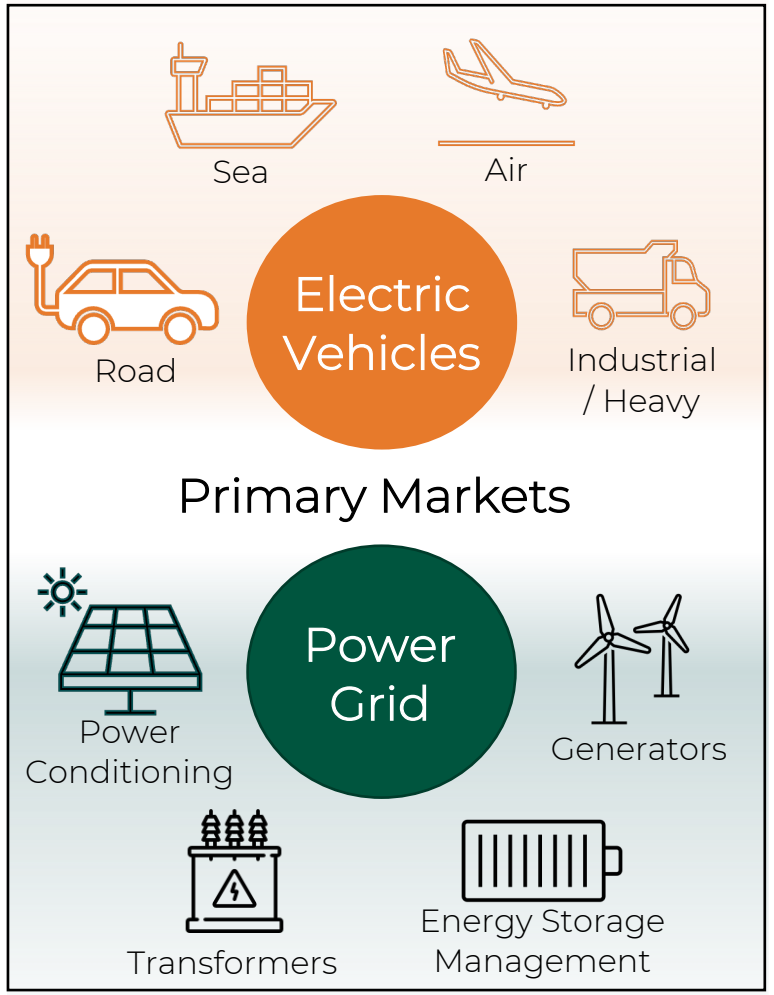
- Education:
  - B.S. in Materials Science and Engineering from Penn State University
  - M.S. & Ph.D. in Materials Science and Engineering from Carnegie Mellon University
    - Focus on new nanocrystalline alloys and processing techniques
    - Performed foundational work for Co-base nanocrystalline strain annealing

# COREPOWER MAGNETICS - SNAPSHOT

- **Formed:** June 2020
- **Spin-Out** from Carnegie Mellon University
- **>20** Granted or Pending Patents
- **Location:** Energy Innovation Center, Pittsburgh PA

Products




COREPOWER MAGNETICS

BATTERY TECH HAS IMPROVED DRAMATICALLY

—YET

# MAGNETICS

## REMAIN MOSTLY UNCHANGED:

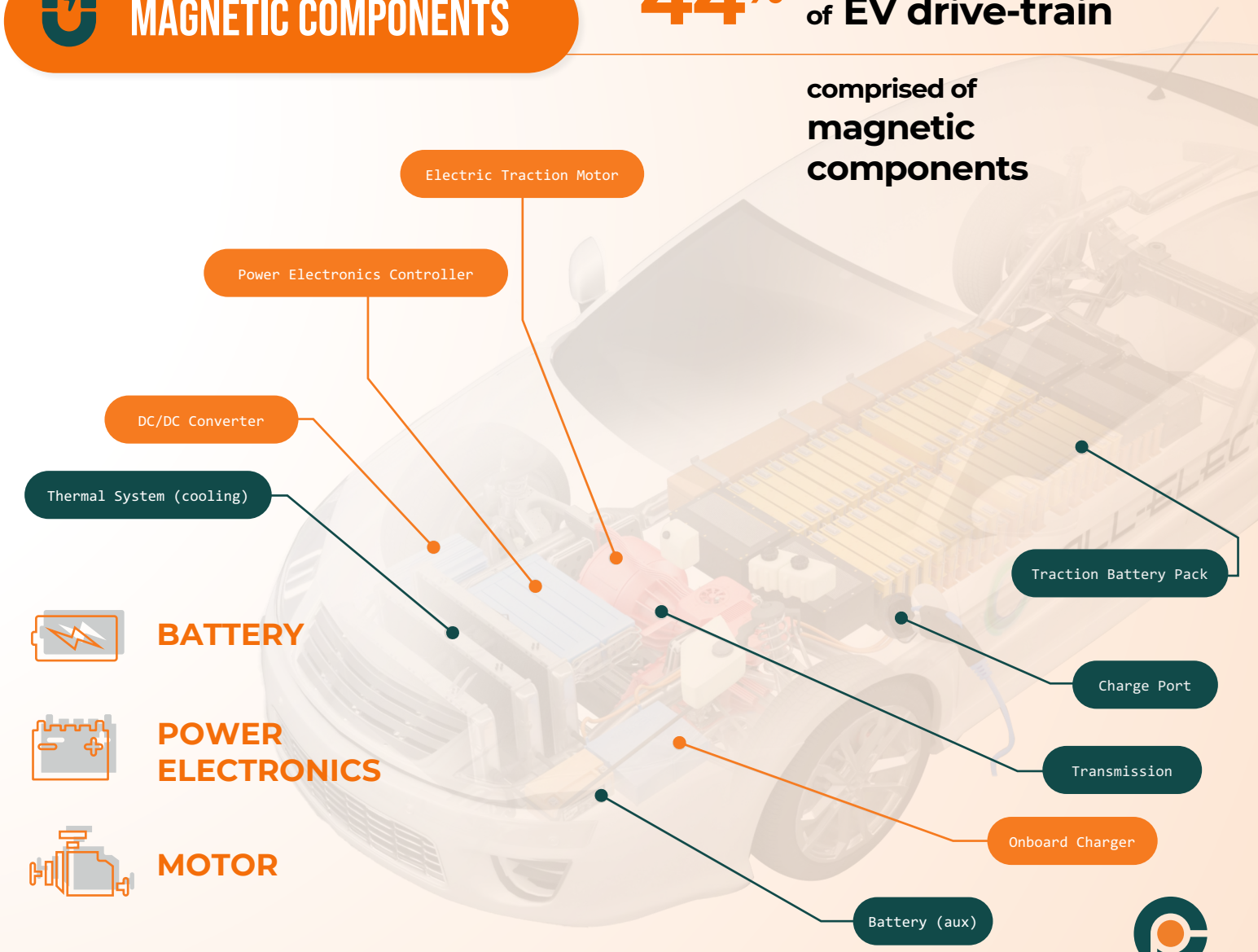
**Bulkiest + most-inefficient parts of the drive chain.**

- ✗ Stalling Progress
- ✗ Weighing down EV's
- ✗ Increasing Costs
- ✗ Negating Battery Improvements

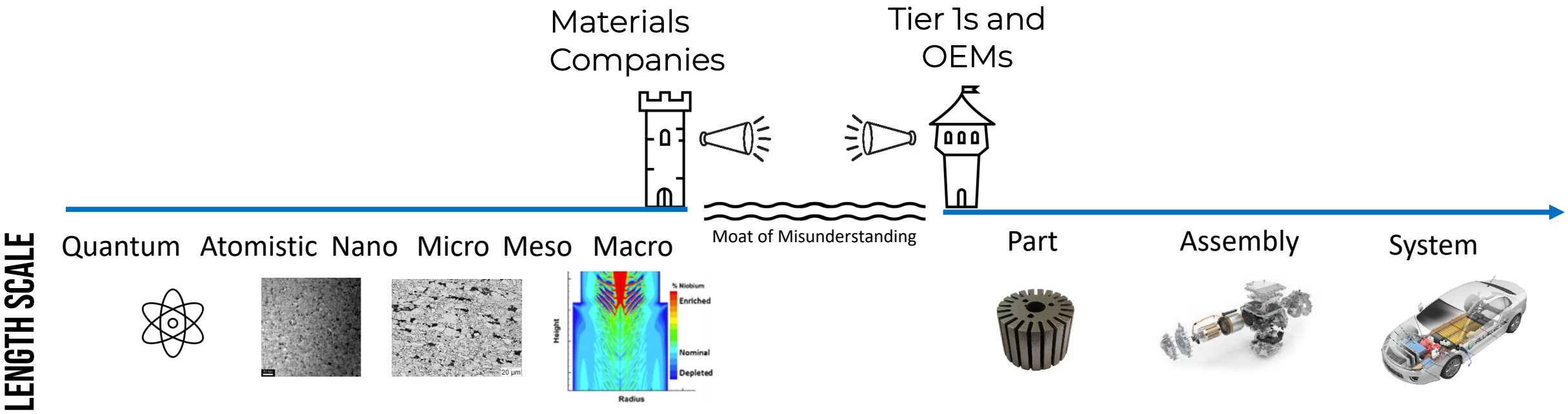
## MAGNETIC COMPONENTS

**44%** of EV drive-train

comprised of **magnetic components**



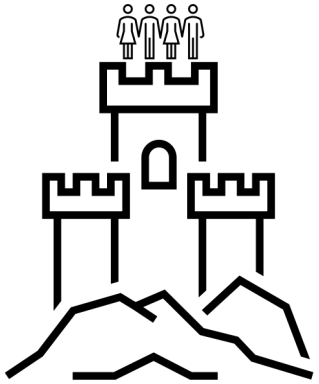
# SUPPLY CHAIN AND ENGINEERING DISCIPLINES ALIGN WITH THE LENGTH SCALES OF DESIGN




COREPOWER MAGNETICS

# DISRUPT THE SUPPLY CHAIN TO FULLY TAKE ADVANTAGE OF ADVANCED DESIGN TECHNIQUES

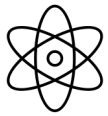
Materials Expertise and Manufacturing Scope

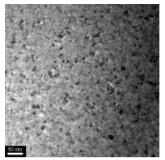


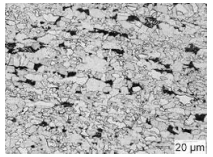
Component Expertise and Manufacturing Scope

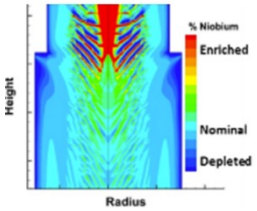
LENGTH SCALE

Quantum Atomistic Nano Micro Meso Macro





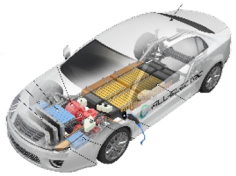



Part

Assembly

System



COREPOWER MAGNETICS

# INDUSTRY CHALLENGES

- Perception that nanocrystalline is only FeSiBNbCu

- Industry standards development needed at material through system level for nanocrystalline applications

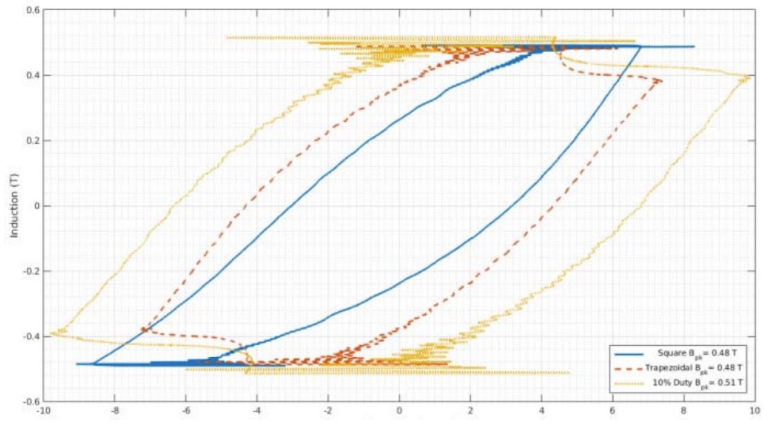
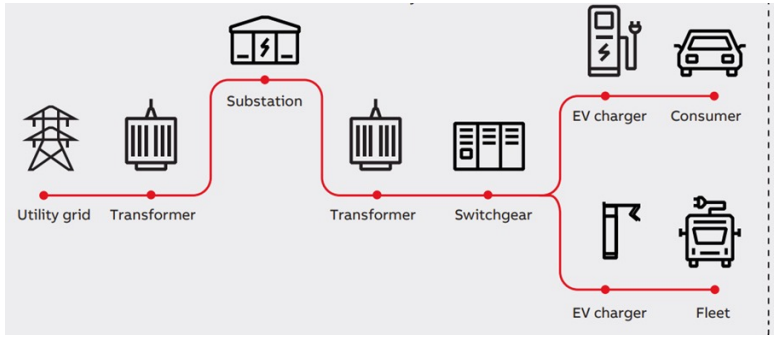



Fig. 24. Hysterisis Loop Comparison for 0.5 T, 20 kHz, for Excitations of: Triangular (Solid), Half Duty (Dashed) and 10% Duty (Dotted).

Beddingfield et. al 10.1109/ECCE.2017.8095816




New opportunities

New Challenges

**Need for the Project:** Solid-state transformers are an emerging technology that replaces the traditional line frequency transformer with additional functions and intelligence. It has gained significant attention in the past 10 years. This is evident as the number of publications in IEEE alone has increased by more than 25x from 2010 to 2020. Around the world, there are many ongoing demonstration projects for different applications, such as smart grid integration, electric vehicle fast charger, wind and solar power conversion, etc. However, there is no standard available as to what is the recommended practice in designing such a device and how to integrate it into the electric grid. The goal of this recommended practice is to bridge the gap by bringing and engaging the top experts in this field.

IEEE Power Electronics Society/Standards Committee (PEL/SC) - P3105