

EEE Research Seminar

Date: March 26, 2024, at 10:30AM

Location: POTR 234 (Fu Room)

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Materials Recycling for Electric Vehicles Application

Abstract

The need to transition to a clean energy economy has received significant global attention in recent years. This has led to pledges by different nations to get to net-zero emissions. For example, the United States targets achieving net-zero emissions by 2050. Of the different strategies for meeting the targets, significant emphasis has been placed on the electrification of transportation systems. This requires advancement in two key components: traction drives and batteries in electric vehicles (EVs). Recycling of the critical metals contained in these components is one aspect of the advancement strategies. Despite several years of research in recycling permanent magnets and batteries, there are still hurdles to overcome towards making a significant impact. This talk will, therefore, focus on approaches employed in the recycling of critical metals from permanent magnets in EV traction drives and batteries. It will include a discussion of the key limitations and the opportunities to overcome those. Some innovative approaches developed in the Critical Materials Innovation Hub and Ames National Laboratory will be presented.

Bio

Ikenna Nlebedim is a scientist at Ames Laboratory and a deputy lead in the Developing Substitutes focus area of the Critical Materials Innovation Hub. He is also an adjunct associate professor at Iowa State University. He obtained his Ph.D. from Cardiff University, United Kingdom. Ikenna's research has focused on the development, modeling, functionalization, and recycling of materials, including rare earth permanent magnets and lithium-ion batteries. As a principal investigator and group leader at Ames Laboratory, he led the multi-institution national research effort that produced the first Made-in-America rare-earth magnet within 20 years, using materials sourced entirely from the United States. Also, he leads a group of researchers developing recycling technologies for rare earths, lithium, cobalt, and other critical elements. He led the research effort that developed the novel environmentally friendly acid-free dissolution recycling process. Ikenna's research has received several patents, R&D100 awards, Federal Laboratory Consortium awards, TechConnect Innovation awards, and Ames Laboratory Inventor awards. His research excellence has also been recognized with an Ames National Laboratory Director's Excellence award and an Iowa State University Professional and Scientific Research award. He is a technical committee member of the IEEE Magnetic Society and was chair of the society's young professionals, as well as a member of the administrative committee.