Growing public awareness of climate change and the importance of national energy security, along with the relatively high costs of transportation fuels have led to increasing emphasis on advanced powertrain designs in recent years. Many of these new concepts rely upon electrification of vehicle drive trains. Lithium ion batteries, with their advantages of power and energy density, high cycle life and the potential for low cost due to high production volumes are seen by many as the key to the successful implementation of electrification strategies in the near future.

A123 Systems’ Automotive Solutions Group is engaged in a wide range of vehicle electrification programs, ranging in size from small, low voltage batteries for micro hybridization to large energy storage systems capable of providing 100+ mile range for full electric delivery vehicles. A123 has developed cells optimized for high power and high energy density, in order to satisfy the diverse requirements of the transportation markets. A key element to being able to integrate the battery cells into systems for vehicle use is the ability to accurately predict the life and functional behavior of the cells in specific use cases. Because the battery performance and life are strong functions of the temperature of the cells during operation and storage, a set of modeling tools, based on first principles and empirical test data, have been developed.

This seminar will provide an overview of the types of applications typically seen in the transportation market, including low voltage, full- and plug-in electric, and hybrid electric systems. An introduction to the fundamental considerations required for battery pack sizing will be provided, with special consideration of environmental, or calendar life and operational, or cycle life. Examples will be presented to illustrate methods for properly sizing lithium ion battery packs for full- and plug-in electric, and hybrid electric systems will be presented.

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All students, faculty, and public are welcome.