

Seminar in Energy

“Energy Storage Systems for Transportation and Grid Applications”

by Dr Lucia Gauchia

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Abstract

Global energy policies are turning towards sustainable energy generation, which are less fossil fuel dependant and present reduced or none pollutant emissions. This implies the increase of intermittent energies such as wind or solar in grid applications and the downsizing or substitution of internal combustion engines by energy storage in transport applications. And it opens a completely and unique opportunity towards grid and vehicle interaction. In both cases energy storage systems, e.g. batteries, play a key role in the consolidation of renewable energies and vehicle electrification. However, energy storage systems first have to overcome important challenges related to, among others, energy and power density, safety and price.

This seminar will review the role of energy storage systems in grid and vehicle applications, and the different available technologies. To be able to integrate energy storage systems as part of the grid or the vehicle propulsion system, it is first necessary to be able to predict its behavior and ageing. Its behavior is highly complex due to the chemical reactions that take place and its evolution due to cycling, temperature, etc. It is therefore relevant to be able to test and simulate energy storage systems to study how the load expectations impact the energy storage performance as well as assess the impact of the expected energy storage operation on the application. Therefore, this seminar will focus on the testing, modeling and real-time simulation of energy storage systems, particularly lithium-ion and ultracapacitors. Experimental results will be presented, as well as a discussion on future research on energy storage.

Biography

Dr. Lucia Gauchia received the Industrial Engineering Degree in 2005 and the PhD degree in Electrical, Electronic and Automatic Engineering in December 2009 from the University Carlos III of Madrid (Spain). She is currently a Postdoctoral Research Associate at McMaster University (Canada), working in the Canada Excellence Research Chair in Hybrid Powertrain in the Electrical and Computer Engineering Department as well as in the Green Auto Powertrains Program in the Mechanical Engineering Department. Her research interests are focused on the testing, modeling and energy management of energy storage systems and fuel cells, in both transport and stationary applications.