

# The 129<sup>th</sup> GREEN Seminar



**Next-Generation Lithium Ion Batteries and Beyond for enabling mass electrification of vehicles**

*Chair: Dr. Shoichi MATSUDA (GREEN)*

**Dr. Khalil Amine**

(Distinguished Fellow, ANL, USA)

Plug-in hybrid (PHEV) and long-range electric vehicles require battery systems with energy densities exceeding 300 Wh/kg while maintaining acceptable cost, safety, and cycle life. Current lithium-ion batteries based on metal oxide cathodes and graphite anodes have improved for hybrid electric vehicles, but durability under the mixed deep and shallow cycling required in PHEVs and EVs remains challenging. To address this, several strategies for increasing energy density are discussed, including high-Ni, low-Co cathodes with dual-mode gradient structures operating up to 4.7 V, PEDOT surface coatings for longer calendar life, non-flammable fluorinated electrolytes, and silicon–graphene composite anodes. Additional approaches include selenium–sulfur cathode systems with tailored electrolytes and a lithium superoxide closed battery system, which could deliver roughly three times the energy density of current lithium-ion batteries.

**Venue:** Auditorium, 1F, NanoGREEN/WPI-MANA Bldg.,  
Namiki-site

**Date & Time:** 10:00-10:40, Tuesday, 7 April. 2026

**Language:** English

**Contact:** [MATSUDA.Shoichi@nims.go.jp](mailto:MATSUDA.Shoichi@nims.go.jp)