Pr. Karim Zaghib, Ph.D, H.D.R.
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BIOGRAPHY

Dr. Karim Zaghib is a world-renowned scientist who specializes in rechargeable batteries (solid-state and Li-ion), energy transition and the electrification of transportation. His scientific publications in these fields have influenced generations of battery researchers and helped to implement safe commercial lithium-ion batteries and uncover their mechanisms via in situ and operando methods.

As senior director of research at Hydro-Québec, he helped make it the world's first company to use lithium iron phosphate (LFP) in cathodes and to develop natural graphite and nanotitanate anodes, witch today is used by Tesla, Mercedes, CATL, BYD ect.

Dr. Zaghib was also one of the pioneers of the first photo-battery with two electrodes and of MWh high-capacity energy storage based on LFP/graphite through a joint-venture collaboration with Sony Corporation. Dr. Zaghib co-authored 400 publications and 20 monographs, including Lithium Batteries: Science and Technology (Springer, 2016), and is named as an inventor of 600 patents and 62 licences. He was elected Fellow of the Electrochemical Society in 2011, of the Canadian Academy of Engineering in 2017 and of the Royal Society of Canada in 2021.

Plenary Title:

"Safe Li-ion batteries and beyond for energy storage and electrification transportation"

Abstract

Lithium-ion and solid-state battery (SSB) are now playing a central role in consumer electronic, energy storage and electric vehicles thanks to their excellent cycle life and high energy density. One of the key components that have paved the way for this success story in the past 27 years is $LiFePO_4$ (LFP) which has served as a lithium-ion host structure for the cathode electrode. Today only LFP is used in both commercial Li-ion (Tesla, CATL, BYD)and SSB batteries (Bolloré), due their safety, low cost (cobalt free), fast charge and discharge, and over 20 years of calendar life.

In this presentation, we will show the progress of the physical chemistry of the olivine compounds. This major improvement has positioned $LiFePO_4$ as the active cathode element of a new generation of Li-ion batteries from cell to pack, hence making a breakthrough in the technology of energy storage and electric transportation. This achievement is the fruit of about 27 years of intensive research in the electrochemical community during which chemists, electrochemists, physicists, and engineers added their efforts to understand the properties of the material, to overcome the obstacles that were met on the way, and finally to reach the state of the art enabling its ubiquitous use in technology today and in the future.