Prof. A.W. Mailvaganam Memorial Oration – 2019

Title: **Development of the Lithium-Ion Battery**

Speaker: **Professor J.R.P. Jayakody**
Professor in Physics, University of Kelaniya.

Venue: **New Physics Lecture Theatre (NPLT), 3rd Floor, Department of Physics, University of Colombo, Colombo 03.**

Date & Time: 23 November 2019 (Saturday) at 5.30 p.m.

(Refreshments will be served before the oration at 5.00 p.m.)

Summary of the Oration

The success of commercial Li-ion batteries in the 1990s was not an overnight achievement, but a result of intensive research and contributions by many great scientists and engineers. There are still notable challenges in the development of next-generation Li-ion batteries (LIB). Since the LIB was first commercialized in 1991, battery performance has risen dramatically. Li-ion batteries, as one of the most advanced rechargeable batteries, are attracting much attention in the past few decades. Since Li has the lowest reduction potential of any element, Li based batteries have the highest possible cell potential. Also, Li is the third lightest element and has one of the smallest ionic radii of any single charged ion. These factors allow Li-based batteries to have high gravimetric and volumetric capacity and power density. Although multivalent cations allow for higher charge capacity per ion, the additional charge significantly reduces their mobility. Given that ionic diffusion in the solid electrodes is often the rate-limiting factor for battery power. LIB are currently the dominant mobile power sources for portable electronic devices, exclusively used in cell phones and laptop computers. Another important expanding market for Li-ion batteries is electric and hybrid vehicles, which require LIB with not only high energy and power density, high charging rate, long life, but also dramatically improved safety performance and low cost. Ion mobility in battery materials strongly influences battery performances. Pulsed Field Gradient (PFG) NMR is a very powerful, noninvasive technique to investigate transport properties in materials developed for the electrochemical storage of energy (such as batteries, fuel cells, or super capacitors). PFG-NMR allows the extraction of a very valuable parameter known as self-diffusion coefficient of each ion.

All are Welcome !!!