High voltage carbon encapsulated-graded LiMn$_2$O$_4$:LiNi$_{1-x-y}$Co$_x$Al$_y$O$_2$ cathodes for rechargeable Li-ion pouch cells

**Overview:** Layered-structures such as LiNi$_{1-x-y}$Mn$_x$Co$_y$O$_2$ and LiNi$_{1-x-y}$Co$_x$Al$_y$O$_2$ are currently used as cathode materials in LIB for high-energy applications. However, practical achievable capacity of these materials are restricted to 150-200 mAh/g due to the limitation in the achievable charging voltage (4.2 V) with acceptable cyclic stability. If over-charge (above 4.2 V) induced surface degradation in LiNi$_{1-x-y}$Co$_x$Al$_y$O$_2$ can be prevented, it is possible to achieve high reversible capacity up to 230 to 250 mAh/g. The minimization of surface induced degradation is observed in surface modified LiNi$_{1-x-y}$Co$_x$Al$_y$O$_2$ (LNCA)

**Key Features**

- Scalable synthesis method
- Higher specific capacity

**Potential Applications**

- Lithium ion batteries

**Funding Agency:** DST

**SEM of Surface modified LNCA**

![SEM Image](image1)

5 µm

**Cyclic stability of the pristine and surface modified LNCA**

![Cyclic Stability Graph](image2)