Improving Li battery performance with graphene and GO

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Abstract

Graphene Batteries AS is working towards the commercialization of two technologies for energy storage devices, a proprietary graphene coated Al foil for energy storage devices and sulphur cathode for LiS batteries which have shown promising results in laboratory scale coin cell.

Cathodes of Li-ion batteries are made on Al foils as current collector. The interphase between the foil and the electrode past defines the electrode impedance especially at high current drains [1]. Our coated foils tested with LiFePO$_4$ cathodes demonstrated >80% capacity retention at 10C discharge rate outperforming uncoated foils and commercial cathodes (Fig. 1).

Li-S batteries are considered among the most promising candidates to achieve high energy density at low cost [2]. Our sulphur cathode tested against Li foil delivered increasing areal capacity of ~2 mAh/cm^2 over cycling with 4 mg.S/cm^2 active material loading. Current effort is directed towards increasing the sulphur utilization to yield 5 mAh/cm^2 for >200 cycles. Next, these results will be demonstrated on larger format cells where we can explore scalability issues and reliably extrapolate performance metrics of the final cells.
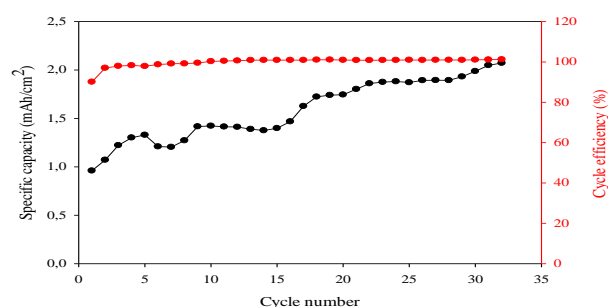
References

[1]   Hsien-Chang Wu, Eric Lee, Nae-Lih Wu, T.Richard Jow, J.Power Sources, 197 (2012) 301-304

[2]   Quang Pang, Xiao Liang, Chun Yuen Kwok, Linda Nazar, Nature Energy, 1(2016) 1-11

Figures
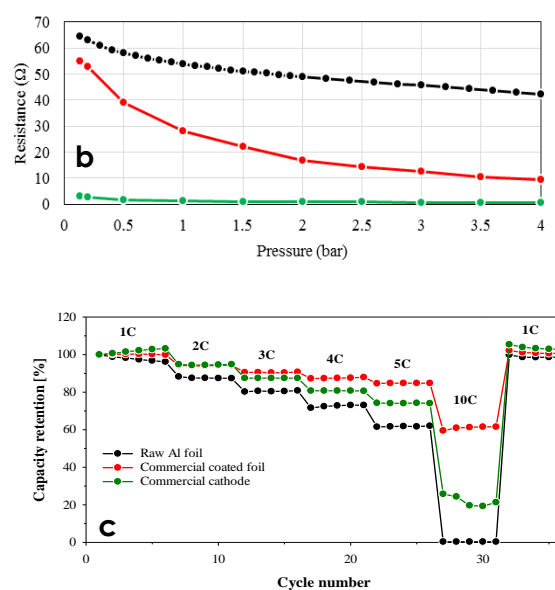
Figure 1: a) Graphene coated Al foil, **b)** Sheet resistance under pressure, **c)** comparative cycling results.

Figure 2: Cycling performance of LiS cell at 0.2C rate.