Non-destructive identification of pouch cell internal defects

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One of the key factors driving electric vehicle adoption is the dramatic fall in cost and increasing energy density of Li-ion cells brought about by new research, better manufacturing techniques and the economies of scale associated with high volume production.[1] Despite this price drop, the cost of electric vehicle battery packs remains above the much-touted figure of $100 /kWh which is seen by many as the tipping point at which electric vehicle mass adoption will occur.[2] Another key concern is that of safety which has been highlighted by battery fires and failures in recent high profile consumer electronics.[3] Non-destructive testing could allow identification of internal defects within cells prior to their integration into packs. There are a variety of techniques, which can be employed including x-ray tomography, thermography and ultrasound.[4,5]

In this work X-ray tomography and thermography have been employed to non-invasively probe commercial EV pouch cells in an attempt to identify the location of potential defects. Once the defects were identified the cells were dismantled to try to correlate the information from the non-destructive techniques with any foreign bodies found inside the cell. The inclusions were extracted from the cells for more in-depth analysis including composition and morphology using SEM and XRD. Ultimately attempting to assess their impact on cell performance and longevity. Investigations into isolating the mechanism by which these defects form and attempt to replicate this formation in new cells has been performed. By better understanding, the mechanism by which defects form a strategy of prevention may be employed. Ultimately reducing the number of rejected cells manufactured and consequently reducing production costs.

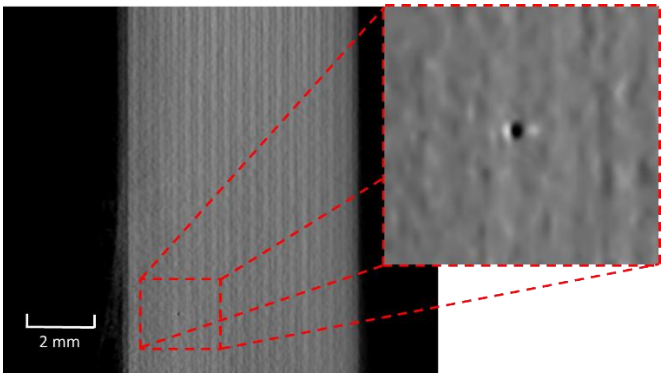

Figure 1 X-ray tomography battery cross-section indicating the presence of an inclusion.

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