The Building Blocks of Battery Technology: Inspiring the next generation of battery researchers

Elizabeth H. Driscoll[1], Ruth Patchett[2], Emily Hayward[1], Paul. A. Anderson[1], Emma Kendrick[3] and Peter R. Slater[1].

[1]School of Chemistry, The University of Birmingham, Edgbaston, B15 2TT, UK

[2]School of Education, The University of Birmingham, Edgbaston, B15 2TT, UK

[3]School of Metallurgy and Materials, The University of Birmingham, Edgbaston, B15 2TT, UK

Ehd345@student.bham.ac.uk

Since the turn of the century, secondary batteries have become big business. The portable electronics industry in the 1990's was driven by the design of the Li-ion battery, and in more recent times, these batteries are underpinning the drive for electrification of vehicles to mitigate the increasingly apparent effects of climate change; thus Li-ion batteries can be described as being everywhere in everyday life.

With our reliance on portable electronics, and the growth of the electric vehicle market, it is important to not only inspire the younger generation to think of their future career in the sciences, but also allow for important concepts which relate to policy to be accessible and understandable to the wider public.

Common current outreach demonstrations for battery work make use of potato-/lemon-electrolyte batteries with a copper coin and zinc nail. Although a great demo to introduce the concept of electrochemical potentials between the metals and circuits, students often struggle to differentiate between the two types of batteries – primary (non-rechargeable) and secondary (rechargeable) and often mistakenly assume the voltage generated to originate from the potato/lemon itself.

With this in mind, we have set out to create demonstrations, which can complement primary battery demos, while showcasing operation of rechargeable batteries using the $LiCoO_2$ – graphite as a basis of the set-up. The talk will highlight our work from the past year through a variety of demonstrations, including our battery jenga[1] set-up and the Royal Society of Chemistry IYPT2019 funded Lithium Shuffle Project battery operation videos[2]. The talk will also touch on outreach funding – the highs and lows, and how the group has continued their engagement work during the difficult period of COVID19.

Figure 1. Left - Jenga adapted to mimic the electrode set-up of $LiCoO_2$ – graphite cell, tactile textures to be accessible for blind and partially sighted students. Right - The Royal Society of Chemistry IYPT2019 funded Lithium Shuffle Project – human sized battery demonstration videos showing charging and discharging processes, suitable for ages 12+.

[1] E. H. Driscoll, E. C. Hayward, R. Patchett, P. A. Anderson and P. R. Slater, J. Chem. Educ., 2020, 97, 2231–2237.

[2] Lithium Shuffle. https://www.rsc.org/news-events/community/2020/mar/lithium-shuffle/ (accessed January 2021)

Keywords: science-communication; Lithium; batteries; inspiration; accessibility.