GTR EVS

'Electrolyte leakage and venting'

JRC Work Update

N. Lebedeva, T. Kosmidou, F. Di Persio, L. Boon-Brett

JRC.C.1

February 2018

Electrolyte leakage/venting verification - Current state of the art

"...visual inspection without disassembling any part of the Tested-Device" is adopted in Phase 1 as a method for verification of the occurrence of electrolyte leakage and venting.

JRC concerns:

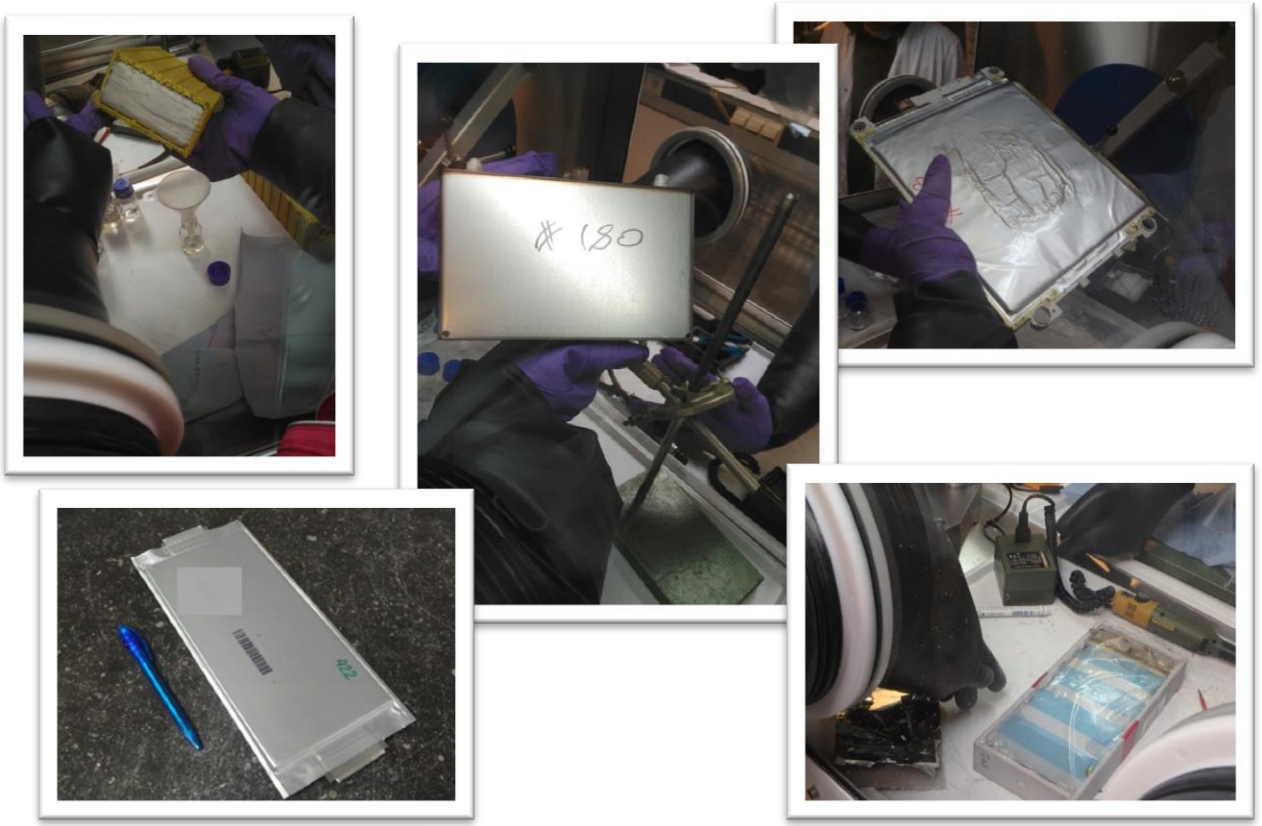
- due to high volatility of the electrolyte components and limited release volume, electrolyte leakage and venting may not always be easily detectable, while potentially creating toxic environment
- special measures may be required to ensure safety of inspecting personnel

JRC work will focus on the development of more robust method(s) to first verify the occurrence of the electrolyte release and/or venting and, if possible, to quantify such release.

Ongoing Work - background

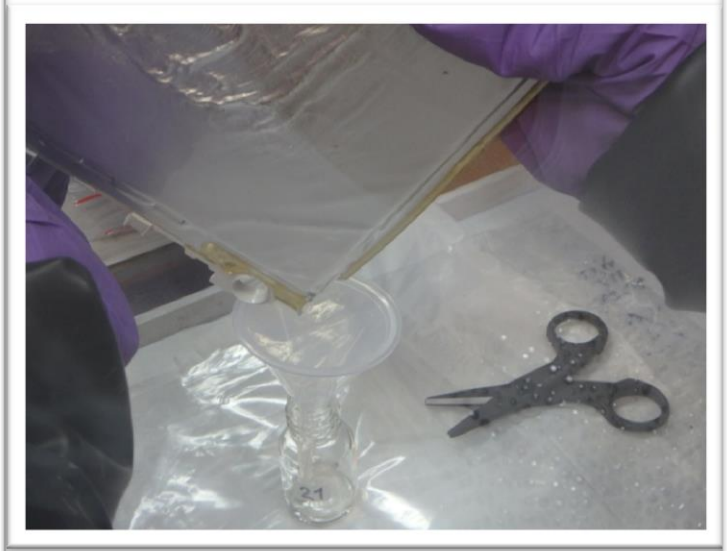
JRC has reported and continues research to quantify the amount of free liquid electrolyte in Li-ion battery (LIB) cells (continuation of research shown in EVS-07-24e.pdf and EVS1414-503.pdf):

- **18** large format cells from 5 different LIB cell manufacturers have been opened in 2017, including **3** cells aged in an electric vehicle and **1** calendar aged cell



Ongoing Work – background

- Fresh cells of 4 out of 5 manufacturers contained up to 40 ml of free liquid electrolyte.
- Some of the aged cells investigated contained free liquid electrolyte.
- Other prismatic cells will be opened and results will be presented soon.

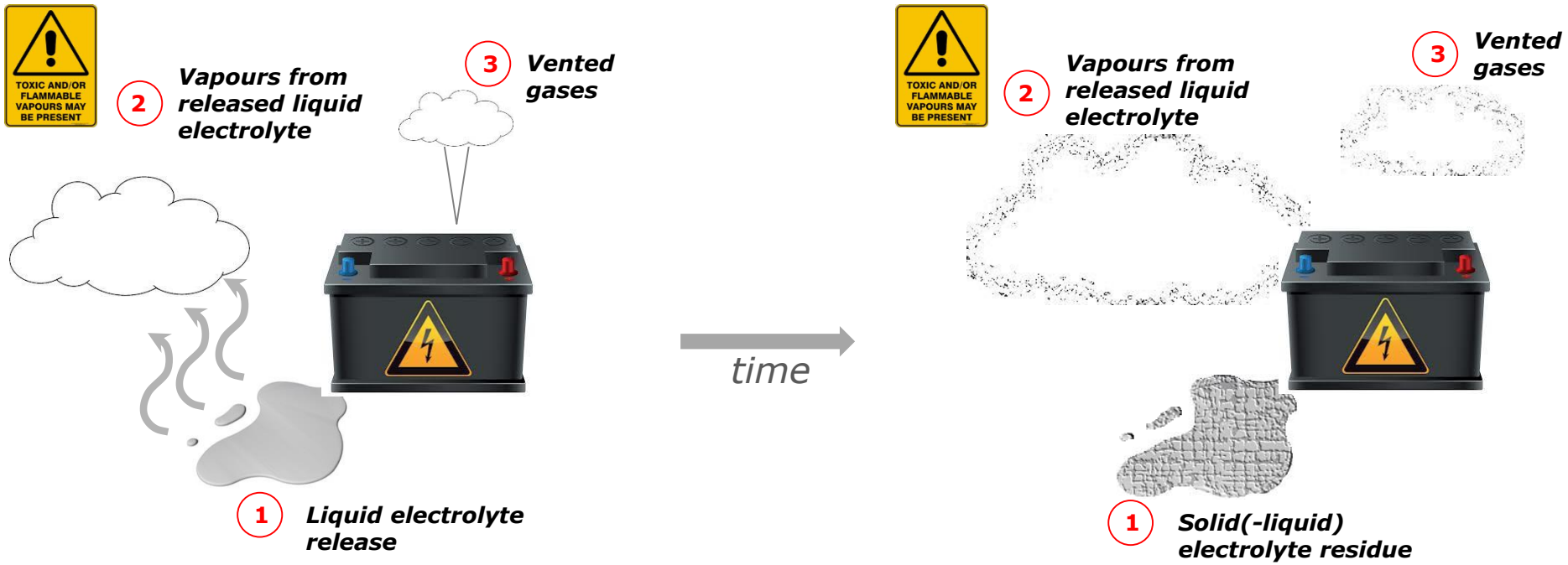


Objective

Development of method(s) for detection and quantification of potentially toxic release associated with electrolyte leakage and venting

The aim is to develop robust and practical method(s), suitable for use within regulatory environment, for detection and quantification of the emissions from traction batteries upon electrolyte leakage and/or venting that delivers reproducible and repeatable results.

Ongoing Work



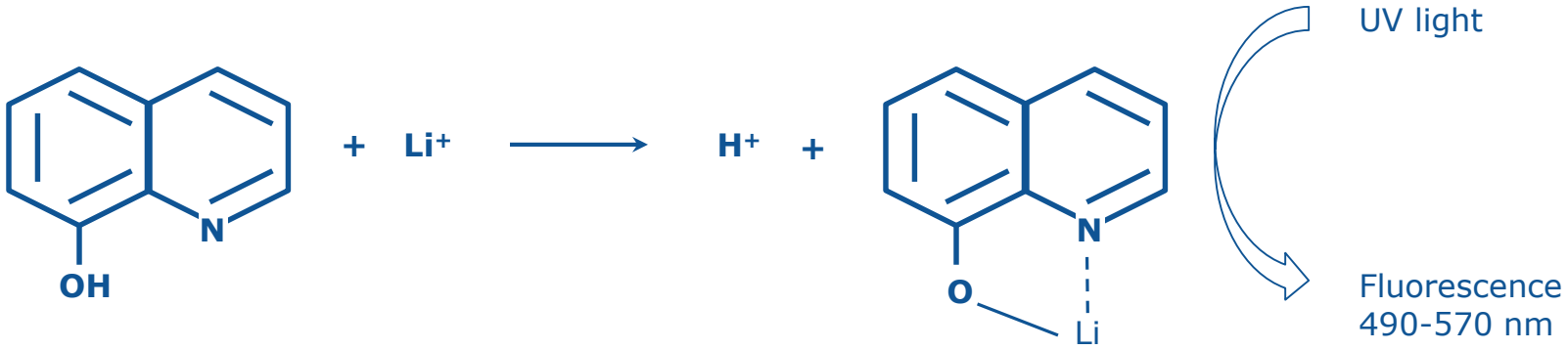
Possible approaches for detection of electrolyte release

1 Detection of Li ion presence

2 + 3 Gas detection

Ongoing Work

1 Detection of Li ion presence



8-hydroxyquinoline

For more information see, for example, N.B. Hansen, Mikrochimica Acta, 1983, II, 277-285

Ongoing Work

② + ③ Gas detection

Approaches under consideration:

- gas sensors
- detector tubes
- remote sensing using FTIR spectroscopy
- remote sensing using LIDAR
- …