

Task Group on Metrology for Li-Ion Batteries

Synopsis

The transport sector is currently responsible for around a quarter of worldwide greenhouse gas emissions, with road transport having the largest contribution ^[1]. For most countries, transport is the largest or second largest source of energy related emissions. Transferring transport from using fossil fuels to using electrical energy from renewable energy sources is therefore a key element of climate action. The transfer is fortunately gaining momentum which can be seen from the significant increase in worldwide sales of electric vehicles ^[1], wherein propulsion systems energized by Li-ion batteries are currently the technology of choice. In response to this development, several national and regional metrology R&D projects have been addressing Li-ion batteries for some years to pave the way for respective metrological services ^[2]. This raises the question about how metrology institutes and the International Committee for Weights and Measures (CIPM) can support this development in the context of the CIPM - MRA ^[3]. Respective metrology covers quite different technical areas which fall into the responsibility of various consultative committees (CC). For instance:

- Impedance measurements and chemical analysis of Li-ion battery cells & materials → CCQM ^[4]
- Charging infrastructure and standards for impedance meter calibration → CCEM ^[5]
- Temperature and calorimetric measurements → CCT ^[6]
- Various spectroscopic measurement techniques for materials analysis → CCRI/CCPR ^[7,8]

The degree of readiness for metrological services is quite different for each technical area. From the perspective of the CIPM-MRA, some activities have already reached a state of comparison measurements while others have not been introduced as relevant CC activities yet. Moreover, there might be some overlap of metrological activities across CCs. For instance, the state of health can be expressed in terms of current measurements (CCEM), electrochemical impedance spectroscopy (CCQM), but also in terms of calorimetric (CCT) or material measurements (CCQM/CCRI/CCPR). Thus, metrological activities of some National Metrology Institutes and Designated Institutes might require interaction between CCs, especially since they address the same stakeholders to some extent.

The electrochemical working group (EAWG) of CCQM has therefore proposed a task group (TG). Its main objective is to identify and evaluate measurands and metrological services related to Li-ion battery technology in the context of the CIPM-MRA in collaboration with other CCs of the CIPM and relevant stakeholders. CCQM has approved the TG in April 2023. Steffen Seitz (PTB), the chair of EAWG, has been appointed as TG chair, and Andy Wain (NPL) as deputy-chair. The TG has an expected runtime of two years.

First, a core team will be created to establish some rules of operation for the TG, and to identify metrological projects and activities related to Li-ion battery technology. Afterwards, representatives of other CCs and WGs will be asked to join the TG. The main activity of this TG will be to prepare and conduct an interactive stakeholder event to address the main objective. Depending on the decision taken at the stakeholder event a roadmap on the implementation of measurands for Li-ion battery technology into the CIPM-MRA framework will be prepared and presented to the concerned CCs.

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<https://www.bipm.org/en/committees/cc/ccqm/wg/ccqm-tg-li-ion/>

References

- [1] <https://www.iea.org/energy-system/transport/>
- [2] see for instance the European metrology research projects 16ENG08, 17IND10 and 21GRD01 at <https://www.euramet.org/metrology-for-societys-challenges>
- [3] <https://www.bipm.org/en/cipm-mra>
- [4] Consultative Committee for Amount of Substance: Metrology in Chemistry and Biology
<https://www.bipm.org/en/committees/cc/ccqm>
- [5] Consultative Committee for Electricity and Magnetism
<https://www.bipm.org/en/committees/cc/ccem>
- [6] Consultative Committee for Thermometry
<https://www.bipm.org/en/committees/cc/cct>
- [7] Consultative Committee for Ionizing Radiation
<https://www.bipm.org/en/committees/cc/ccir>
- [8] Consultative Committee for Photometry and Radiometry
<https://www.bipm.org/en/committees/cc/ccpr>