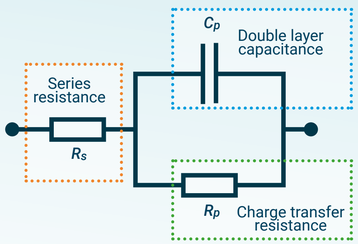
PARAMETER ESTIMATION OF LI-ION BATTERIES WITH ARDUINO BASED BOARD

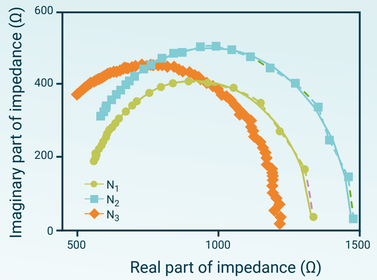
Strentex

1. A Randles circuit, originally proposed in 1947, is widely accepted as a reliable characterization tool of various electrochemical sources.

2. This paper proposes the parameter estimation of the Randles equivalent electrical circuit with embedded hardware (Arduino boards, for example).

3. It is not software platform-specific, which enables a high level of portability. The presented method is verified with theoretical, numerical and experimental analysis.





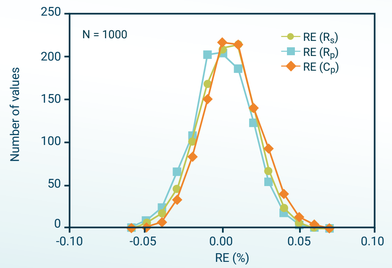
Panasonic 18650PF Battery 2.9 Ah

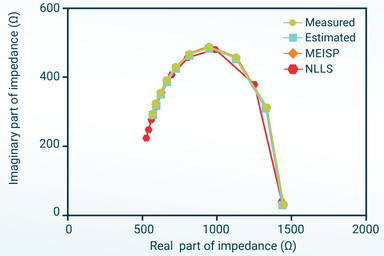
Digatron EIS Meter Accuracy: ±1% (magnitude), ±1° (phase angle)

Thermal chamber: *Cincinatti Sub Zero ZP-8*

Performance testing

- 1000 noise free datasets
- 1000 noisy datasets
- Panasonic 18650PF Li-ion battery impedance
- Comparison with non-linear least squares (NLLS) implemented in MATLAB and PC-based software (MEISP).





The successful deployment on the microcontroller board with available 8 kB of SRAM, clock speed of 16 MHz and energy consumption lower than 53 mJ. Parameter estimation of dataset with 100 points was performed in 106 ms.

Mitar Simić, Adrian K. Stavrakis, Varun Jeoti, and **Goran.** M. Stojanović, „A Randles Circuit Parameter Estimation of Li-ion Batteries with Embedded Hardware“, IEEE Transactions on Instrumentation & Measurement (IF2021=5.332), ISSN: 0018-9456, Vol. 71, pp.1-12, 2022, doi: 10.1109/TIM.2022.3183661