Impedance Measurements - Instruments, Sensors & Beyond: An introduction on how to choose, design and successfully use setups for electrical impedance spectroscopy

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Accurately performing electrical impedance spectroscopy can be a challenging task. Choosing equipment, sensors and configurations for impedance measurements involves making many choices building on a deep understanding of specifications, parameters, and general options that even for experienced engineers and scientists can be tricky. Complex cross-dependencies of the components, practical limitations and all too often, unprecise not generally applicable assumptions are just a few of the obstacles to navigate. This tutorial discusses the most important aspects of measurement setups for electrical impedance spectroscopy and illustrates those on many real-life reference cases both from academic research and industrial application. Some of the topics covered include:

- Brief review of basics of impedance spectroscopy
- A tour of common and some not so common impedance applications
- Measuring impedance – overview of available instrument classes and their individual strengths
- Deep dive into the most important specifications and what they practically mean

- Multichannel options

1. Parasitic influences
2. Electrodes and sensors

All topics are illustrated with practical examples for better understanding of their implications. The goal is to deliver a good understanding of the most important things to watch out for when performing impedance measurements, give practical advice on choices and options and shed some light on a few things that all too often are dominated by over-simplifications or commonly found false assumptions.