Workshop on Electrochemical Impedance Spectroscopy

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Venue: Nelson Mandela African Institution of Science and Technology (NMAIST)

Facilitator;

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Purpose of the workshop;

Electrochemical Impedance Spectroscopy (EIS) is one of the most complex techniques in electrochemical research; in the last 10 years gained a lot of attention and become more popular. Still many doubts are around the use and the interpretation of the data. This workshop will help the students to understand why the use electrochemical impedance is so important, how to manage the different equivalent circuits elements.
EIS allows separate the influences of different components that means the contribution of the electron transfer resistance, double layer capacity, etc. EIS is very surface sensitive: which makes many changes visible that other techniques don't see, for example changes in polymer layers due to swelling, surface changes due to protein adsorption or penetration of corrosion protection layers, monitoring charge-discharge electrical variation on a battery. In Material science can use to study dielectric or ferroelectric proprieties.

Outline

- Why Electrochemical Impedance Spectroscopy?
- EIS Theory
- Electrochemical interface and electrical circuit review
- EIS working conditions
- Case studies:
  - Corrosion applications
  - Batteries and energy applications (Solar and fuel cells, Supercaps)
  - Dielectric Materials
  - Biosensors
  - Other applications (Catalysis, environmental)
- Experimental design, Instrumentation and practical part

Table 1 Timetable for Electrochemical Impedance Spectroscopy

Time	Activity
0800-0830	Introductions and purpose of the workshop: why Electrochemical impedance
0830-1000	EIS Theory
1000-1030	Break
1030-1230	Case studies
1230-1330	Lunch
1330-1430	Experimental design and Instrumentation
1430-1530	Practical experimental part I
1530-1600	Break
1600-1700	practical experimental part II