Workshop on Sustainable and Biomass derived Materials for Future Energy Storage

Date: 10 – 11 December 2022

Venue: l'Université Cheikh Anta Diop de Dakar (*UCAD*) II

Facilitator:

Prof. Ncholu Manyala

Physics Department, University of Pretoria, Carbon-Based Nano-Materials Group, Pretoria, South Africa

E-mail: ncholu.manyala@up.ac.za

Purpose of the workshop

To equip participants with basic knowledge of electrochemical capacitors/Supercapacitors using nano-carbon derived from biomass and its composites with metal oxides/hydroxides to for hybrid supercapacitors. The expectation is that upon returning to their home institutions, the participants would be equipped with enough knowledge to make use of biomass wastes which are abandoned in Africa to convert them into useful materials as electrode materials for energy storage such as supercapacitors. The participants are also expected to be able to make a network within the AMRS which should lead to sustainable collaboration.

Outline

Introduction of Electrochemical capacitors/Supercapacitors:

The Electrochemical capacitors/Supercapacitors are electrochemical energy storage devices with high specific power, but moderate specific energy and bridge the gap between conventional capacitors with high power and batteries with high specific energy. There three types of Electrochemical capacitors:

(i) Electric double layers capacitors (EDLC)
(ii) Pseudo-capacitors
(iii) Faradic capacitors or battery-type capacitors

These three types of supercapacitors will be discussed based on their mechanisms and relevant materials.

Electrolytes for Electrochemical capacitors:

There different types of electrolytes for supercapacitor which control the cell potential of the device:

(i) Aqueous electrolytes
(ii) Organic electrolytes

(iii) Ionic liquids electrolytes

These electrolytes will be discussed to show the role they play in the electrochemical device.

Discussion on activated carbon from biomass wastes:

Activated carbon from biomass wastes as electrodes for electrochemical capacitors Discussion will be based on the different sources of biomass wastes and synthesis methods of producing activated carbon. The use of such activated carbon as electrodes for electrochemical capacitors with specific examples. The symmetric devices as well as hybrid devices will be discussed.

Table 1: Time table for the Biomass wastes derived Materials workshop

Time	**Activity**
08:00 – 08:15	Introductions and the purpose of the workshop
08:15 – 10:00	Introduction of electrochemical capacitors and their properties
10:30 – 10:30	Break
10:30 – 12:30	Electrolytes and Activated carbon synthesis methods and characterization from biomass wastes
12:30 – 13:30	Lunch
13:30 – 15:30	Discussion of different examples of devices of AC from biomass
15:30 – 16:00	Beak
16:00 – 17:00	General discussion