“Electrochemical Sensor for Obesity Reducing Medicinal Plant”

Project Reference No: 46S_MSc_150

Name of the college

Basavaprabhu, Arts, Science and Commerce College, Chikodi

Branch: MSc. Botany

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Introduction:

Obesity and overweight have become a major public health concern, and its incidence rising at an alarming rate. Obesity is one of the major types of metabolic syndrome, resulting in various types of problems such as hypertension, diabetes, dyslipidaemia, and excess fat accumulation, cardiovascular complications, asthma, arthritis, non-alcoholic fatty liver, degenerative disease, etc.

Medicinal plants which have been used in traditional medicinal science to treat various diseases have relatively minimum or no negative impacts and toxicity.

In this study we have selected medicinal plants which are known to be having phytochemicals which has obesity reducing potential. there are many medicinal plants such as *Garcinia indica*, *Terminalia chebula*, *Acalypha indica*, *Garcinia cambogia*, *Terminalia*

bellirica, Hibiscus sabdariffa, etc. By observing the plant potential, we have chosen *Acalypha indica* for this study

We are designing a electrochemical sensor by using graphene electrode and coating it with Lanthanum ferrite nanoparticles to sense the chemical compounds present in the plant, through Cyclic Voltmeter machine which gives the result by curves as oxidation and reduction peaks. This shows us that the plant contains some phytochemicals in it and by this result we can derive that which phytochemicals will help to reduce the risk of obesity disease.

Objectives:

1. Detailed literature survey on obesity reducing medicinal plant.

2. Developing a new electrochemical method for the detection phytochemical constituents in the medicinal plants.

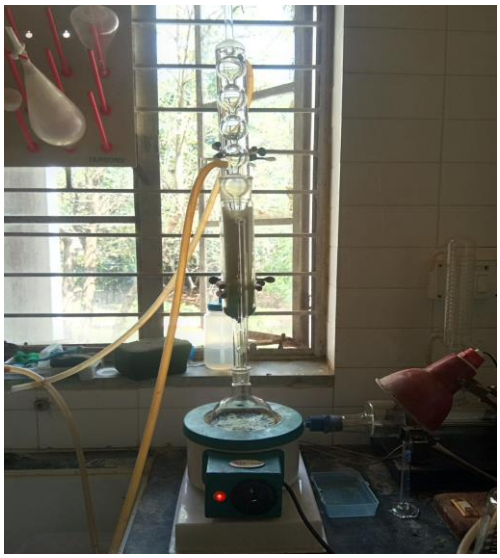
3. Study the electrochemical behaviour of phytochemical constituents in the medicinal plants.

4.Study the antimicrobial and other characterizations.

Methodology:

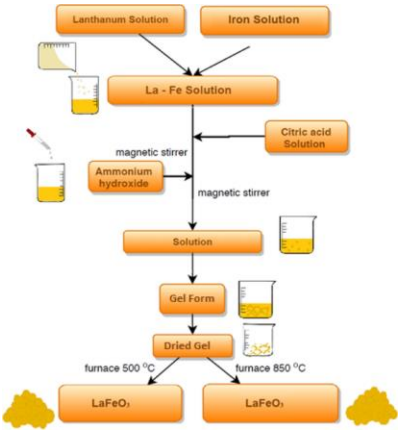
1.Preparation of plant extraction:

Acalypha indica plant extract was prepared by Soxhlet method. Whole plant was shed dried, powdered.70% Ethanol used as solvent, the Soxhlet apparatus was run for 8 hours at 60^0c temperature.



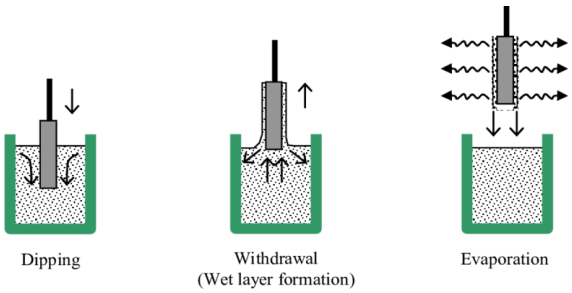
2.Preparation of Lanthanum ferrite (LaFeO3) nano-particles:

Preparing of Lanthanum ferrite Nano particles was done by so gel method as shown in image-



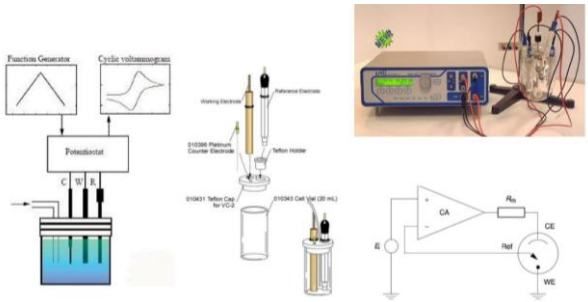
3.Prepartion of Electrochemical Sensor-

Graphite rod is reduced to graphite oxide to increase its conductivity, which then known as graphene electrode, Graphene rod is coated with lanthanum ferrite nanoparticle to increase the sensitivity of the electrochemical sensor.



4.Cyclic voltammetry instrumentation:

A CV system consists of an electrolysis cell, a potentiostat, a current-to-voltage converter, and a data acquisition system. The electrolysis cell consists of a working electrode, counter electrode, reference electrode, and electrolytic solution.



Materials:

1.Soxhlet apparatus, Whatman's filter paper

2.Magnetic stirrer, furnace

3.Beaker, dryer

4.Cyclic voltammetry instrument, working electrode, reference electrode, counter electrode.

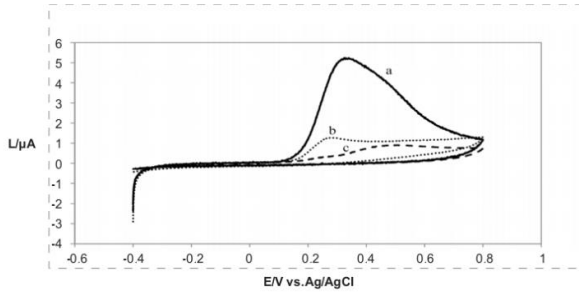
Chemicals:

1.70% Ethanol

2.Lanthanum solution, iron solution

3.Graphite electrode, lanthanum ferrite Nanoparticle

Results:



Conclusion:

Cyclic voltammetry can be used to characterize the antioxidant (reducing) ability of whole plant extracts. The measured oxidation potential could be closely related to the free radical scavenging capability of the investigated extract. By using the rapid and simple electrochemical methods without time consuming sample preparation, two parameters could be obtained: the anodic peak current (Ipa) and the first oxidation potential (Epa). Low oxidation potentials in samples show their high antioxidant capacity. As many unknown structures could occur in the extract, since current is an additive magnitude, the amperometry current shows the contribution of all complex structures included in the extract.

Innovation:

Generally, the standard electrochemical sensors used are very costly such as Glassy Carbon electrode but the electrochemical sensor prepared in this study is not so expansible, fast, and accurate which is affordable for all the basic laboratory settings and no expatriation required for handling the electrodes.

Future Scope:

More advanced and specific electrochemical sensors can be developed, which can be used for fast and accurate phytochemical Characterization which can be affordable for all the basic laboratory settings.

Graphical representation:

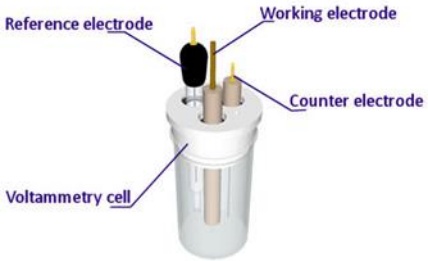
Acalypha indica

Plant powder

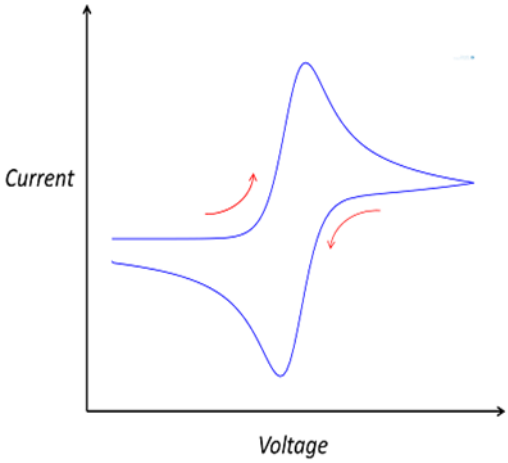
Plant extract

Soxhlet's apparatus

Electrode



Electrochemical Cell



Cyclic Voltmeter

Curve