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# Circular Dichroism Spectroscopy

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## Introduction

Circular dichroism spectroscopy may be a sort of light absorbance spectroscopy that measures the differences within the absorbance of right and left polarized light.

## Principle of Circular dichroism spectroscopy

Left- and right-handed polarized components of the incident light are absorbed differently by the sample, which yields a difference within the absorption coefficients. This difference is termed circular dichroism.Circularly-polarized light rays will travel through an optically active medium with different velocities thanks to the various indices of refraction for right- and left-circularly polarized light.Optically active chiral molecules will preferentially absorb one direction of the circularly polarized light.The peptide bonds in protein act as chromophores. The peptide bonds are the optically active chiral molecules of protein, and therefore the number of chromophores is proportional to the magnitude of absorption.Thus, the magnitude of absorption is then used for the verification of the adopted secondary structure of proteins.

## Steps of Circular dichroism spectroscopy

The sample is placed during a transport vessel with buffers which is then placed within the spectrometer.In the spectrometer, left and right circularly polarized light passes through the sample in an alternating fashion.The photomultiplier detector within the spectrometer produces a voltage proportional to the circular dichroism (the difference between the absorbance of left and right polarized light) of the resultant beam emerging from the sample.The circular dichroism of the sample is then compared with standard proteins to work out the differences within the secondary structure of the proteins.

## Uses of Circular dichroism spectroscopy

The primary application for CD spectroscopy is that the verification of the assumed secondary structure of the protein. This method allows the detection of percentages of α-helix and β-sheet in proteins base on their circular dichroism. Circular dichroism spectroscopy also can be wont to monitor changes of secondary structure within a sample over time.This technique also can be wont to compare two macromolecules to detect the differences within the structure of the molecules.It also can be used for the analysis of pharmaceutical products to make sure that they're still present within the folded active conformations.

## Electrochemical impedance spectroscopy (EIS)

Electrochemical impedance spectroscopy is a complicated electrochemical technique that measures the impedance of a system by applying different AC potential frequencies.

## Principle of Electrochemical impedance spectroscopy (EIS)

Electrochemical Impedance Spectroscopy may be a technique that measures how a replacement material or device impedes the flow of electricity.This is done by applying an AC signal through the electrodes connected to the sample.AC voltage at different frequencies is applied to a sample, and therefore the electrical current is measured.A Nyquist plot is generated from the response of frequency to the electrical impedance by plotting the impedance on the y-axis and therefore the frequency on the x-axis.The instrument applies an alternating field voltage to the sample and measures the present response.The real and imaginary components of impedance are calculated by determining the phase shift and alter in amplitude at different frequencies.

## Steps of Electrochemical impedance spectroscopy(EIS)

A test module is first hooked to the EIS that confirms that the wires connected to the system are hooked correctly, and every one the parts are working correctly.To start the flow of current within the system, the Zplot software is operated on the pc . the specified parameters are set, and therefore the AC amplitude is about to 10mV. The initial frequency is about to 1× 106 and therefore the final frequency to 100Hz.The Zview software is then operated to look at the results.The electrodes are then faraway from the test module.The sample is ready and assembled into the test furnace located within the hood fume.The electrodes are attached to the assembly, and therefore the EIS is operated because the same previous procedures.

## Uses of Electrochemical impedance spectroscopy(EIS)

The impedance of a sample are often wont to determine the population of microorganisms when bacteria grow during a sample.EIC also can be wont to screen for cancer tissues where the impedance of the electrical current changes because the cell structure and size changes.This has also been wont to study the appliance of layers of chemicals, polymers, or coatings to electrodes which give useful enhancements in terms of electron transfer and sensitivity.