

Thin Film Epitaxy

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ABSTRACT

Epitaxy simply refers to the process of depositing or growing crystal overlay on a substrate. Dr. Haiyan Wang's research group specializes on functional thin film materials. For example, coating high temperature superconductor material on a metal substrate. The resulting wafer is very flexible that can be used as cables for transmission lines or new generation motors. It can also be used to different electronic devices and other consumer product. Another area of their research revolves around thin film solid oxide fuel cells which are lighter but have a higher energy density capacity. Needless to say, this modern power supply is expected to last longer and charges at a shorter amount of time.

Clement Jacob is a Doctor of Philosophy candidate of the Functional Thin Film research group. His work on thin film lithium rich cathode is the reference to this lesson module. His work on a variety of target materials, substrate, and deposition process is represented in an activity called "Watts Up?!" In this activity, instead of a using a variable power source, the students are going to design and construct a crude battery using common household materials. This serves as the new source of electromotive force. They need to come up with the right configuration of anode, cathode, and electrolyte that will provide the maximum potential difference. Afterwards, they need to connect this homemade battery to a simple electric circuit on a breadboard. The voltage drop and current flowing through an unknown load will then be measured. Finally, the resistance of each load will be calculated using Ohm's Law.