

Group : 7

AMERICAN INTERNATIONAL UNIVERSITY BANGLADESH
Faculty of Engineering
Laboratory Report Cover Sheet



Students must complete all details except the faculty use part.

Please submit all reports to your subject supervisor or the office of the concerned faculty.

Laboratory Title: Determination of Characteristic Curve of a Diode

Experiment Number: 01 Due Date: _____ Semester: Fall 2022-2023

Subject Code: EEE 2104 Subject Name: Electronic Devices Lab Section: C

Course Instructor: Dr.Mohammad Shidujaman Degree Program: BSc EEE

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For faculty use only:

Total Marks:

Marks Obtained:

Faculty comments

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Title : Determination of characteristic curve of a Diode

Abstract :- A diode is a semiconductor device that essentially acts as one-way switch — it allows current to flow easily in one direction, but severely restricts current flowing in the opposite direction.

A diode is simply a PN junction. But its applications are extensive in electronic circuits. There are three important characteristics of diode.

First one is the forward voltage drop. Under a forward voltage bias condition this should be about

0.7 voltage. Then there is the reverse voltage drop. In the reverse when we reverse bias the diode the depletion layer widens and usually the applied voltage are felt across the diode.

objectives:

1. To become familiar with semi-conductor diode.
2. To determine the characteristic curve of semi-conductor diode.

Apparatus:

1. Diode
2. Resistor
3. DC power supply
4. Multimeter
5. Board

Theory and Methodology:-

Diode Structure:- The semiconductor diode is created by simply joining an n-type and p-type semiconductor material in contact with n-type semiconductor material. A variety of semiconductor materials can be used to form PN junctions like silicon, gallium etc. However we will concentrate on silicon as it is the most widely used material in microelectronics. In actual practice both the p and n regions are part of the same silicon crystal. The PN junction

is formed by creating regions of different doping within a single piece of silicon. The material is doped by bringing in additional atoms. The impurities can be either donor or acceptor atoms. The word donor acceptor and donor can be associated with donating and accepting electrons.

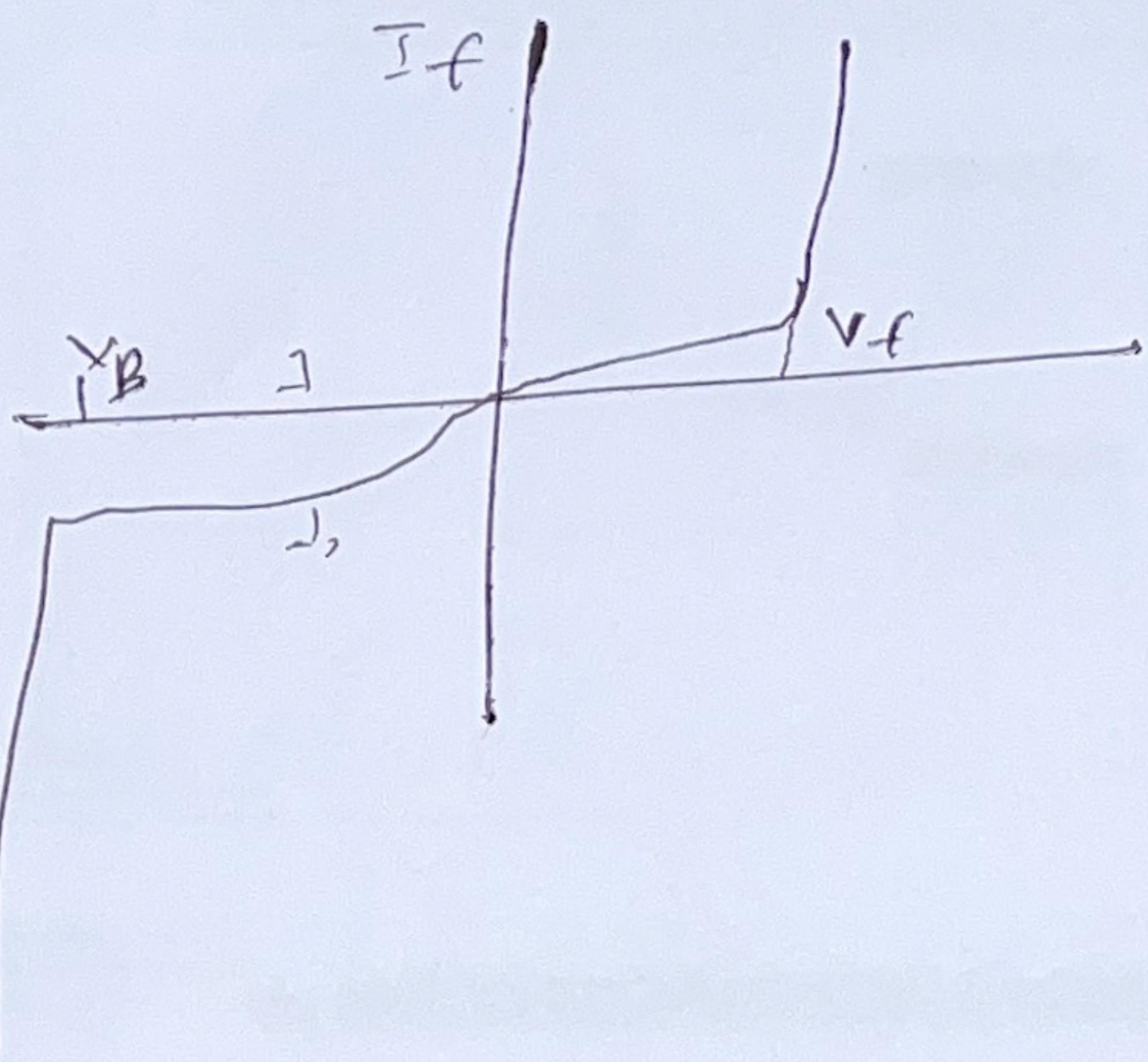
PN junction: PN junction diode is formed when a P-type semiconductor is used to an n-type semiconductor creating a potential. The effect described in the previous diagram

Bias characteristics:- If a negative voltage is applied to the PN junction the diode is termed biased. In response free holes and electrons are pulled towards the end of the crystal and away from the junction. The result is that all available carriers are attracted away from the junction, and the depletion region is extended. There is no current flow through under such conditions. If the applied voltage is positive the diode operation is forward bias.

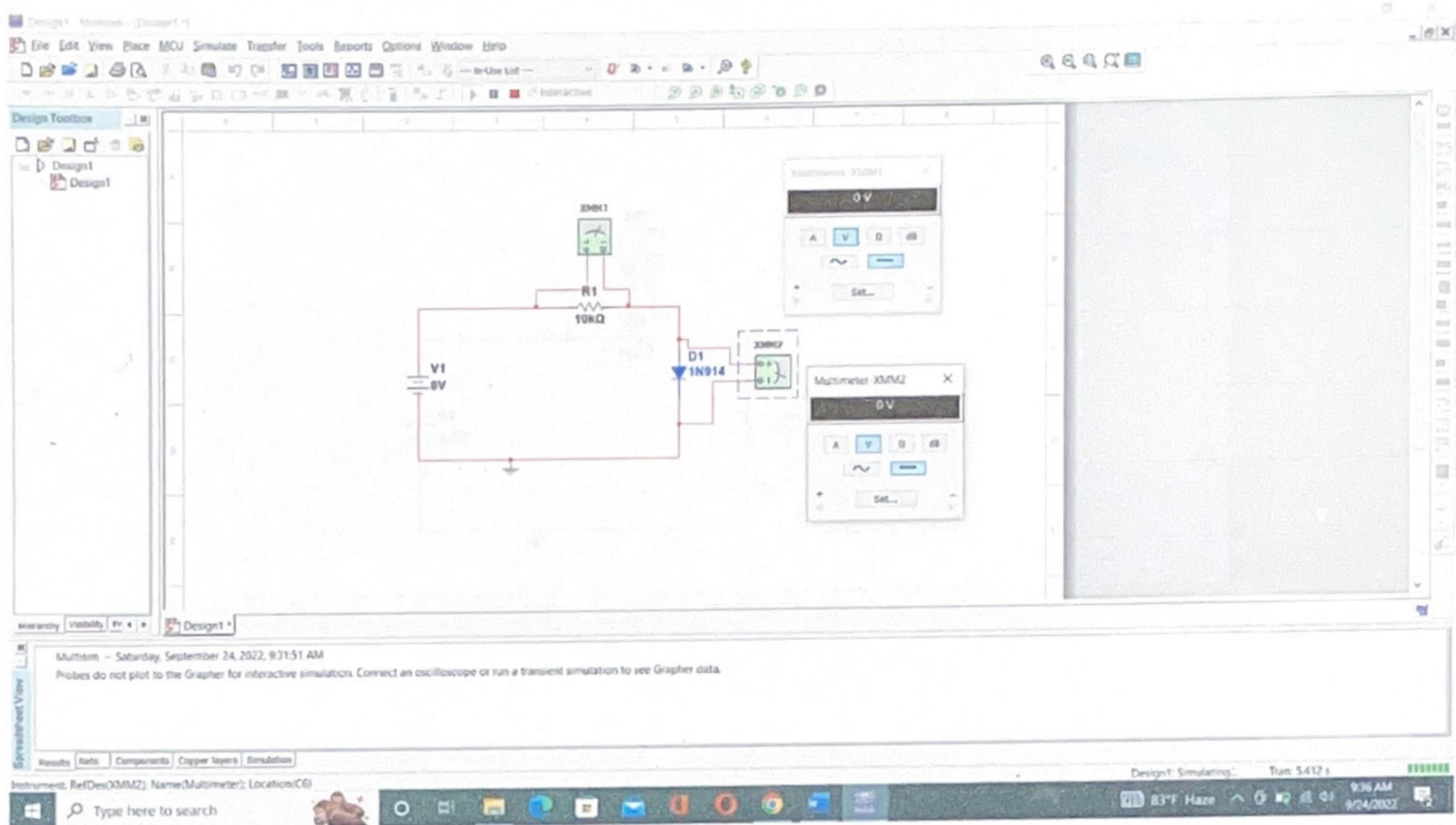
is achieved without any external voltage being applied to the actual PN junction resulting in the junction being in a state of equilibrium.

However if we were to make electrical connections at the ends both the N-type and P-type materials and then connect them to a battery source.

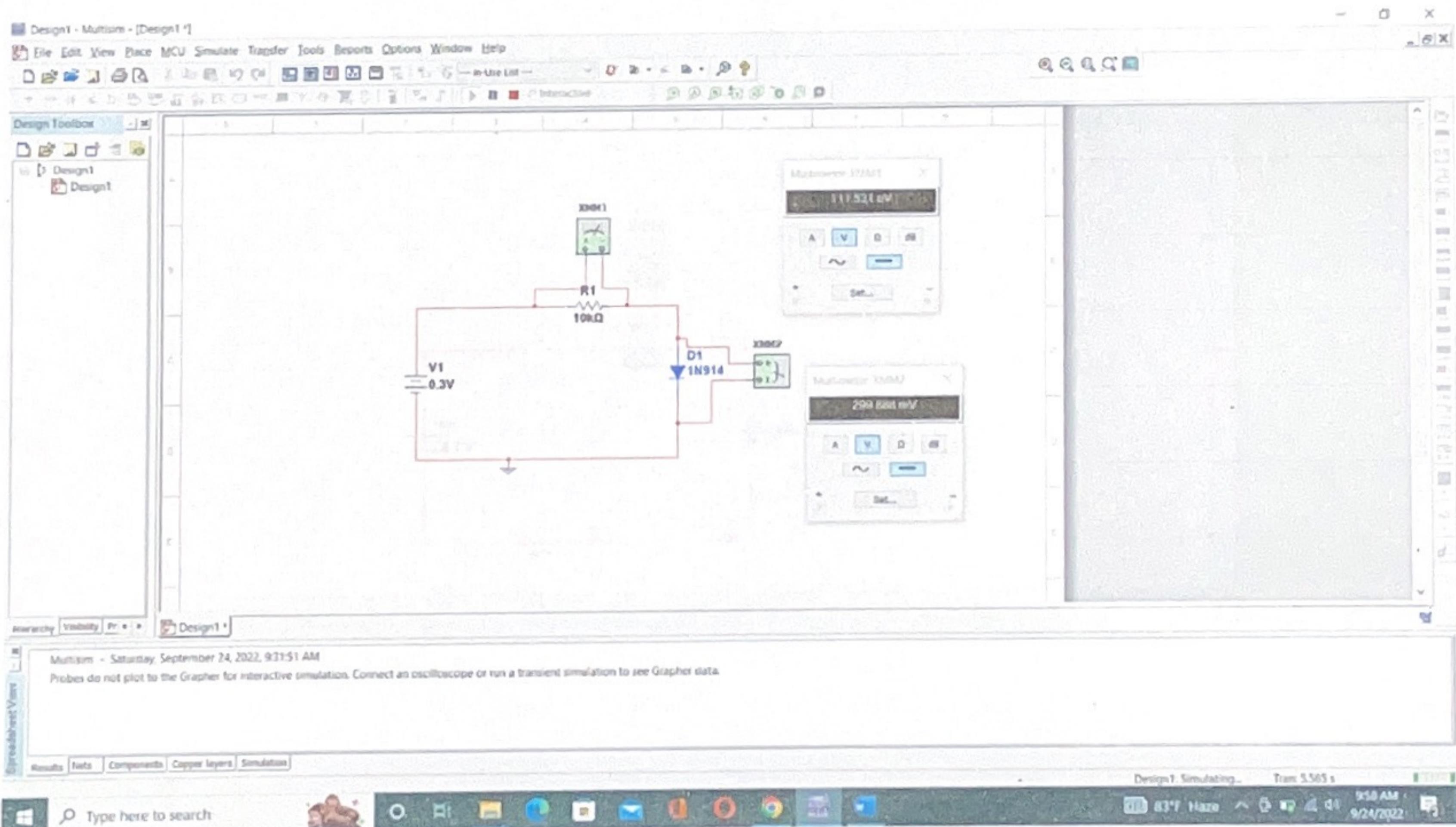
The effect of adding their additional energy results in the free electrons being able to cross the depletion region from one side to the other.



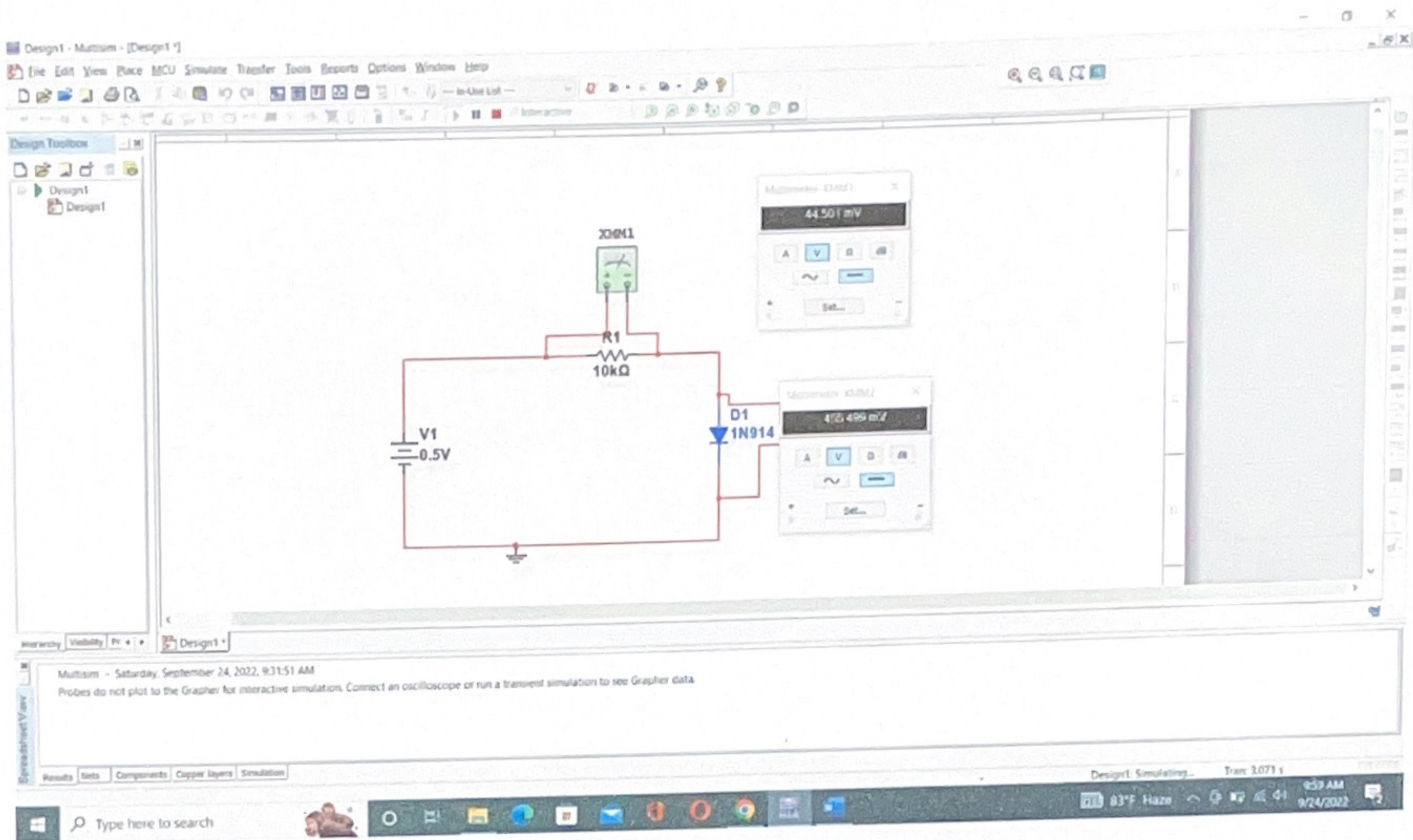
Diode characteristics: In forward bias condition, a cut-in voltage has to be overcome for the diode to start conduction. In silicon, this voltage is about 0.7 volt. In reverse bias condition, the current is limited for higher value of reverse voltage, the junction breaks down.



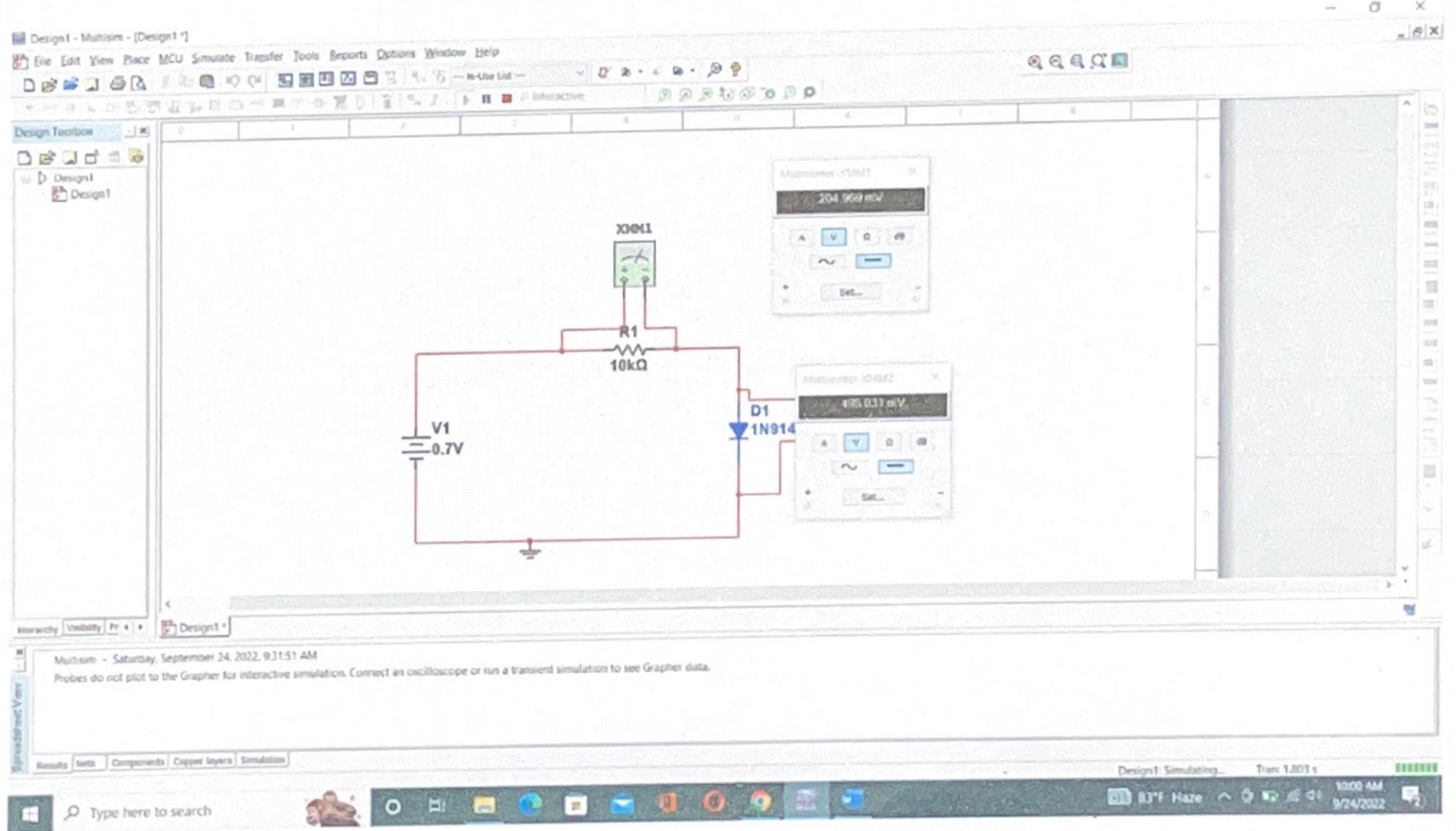
For 0.3V



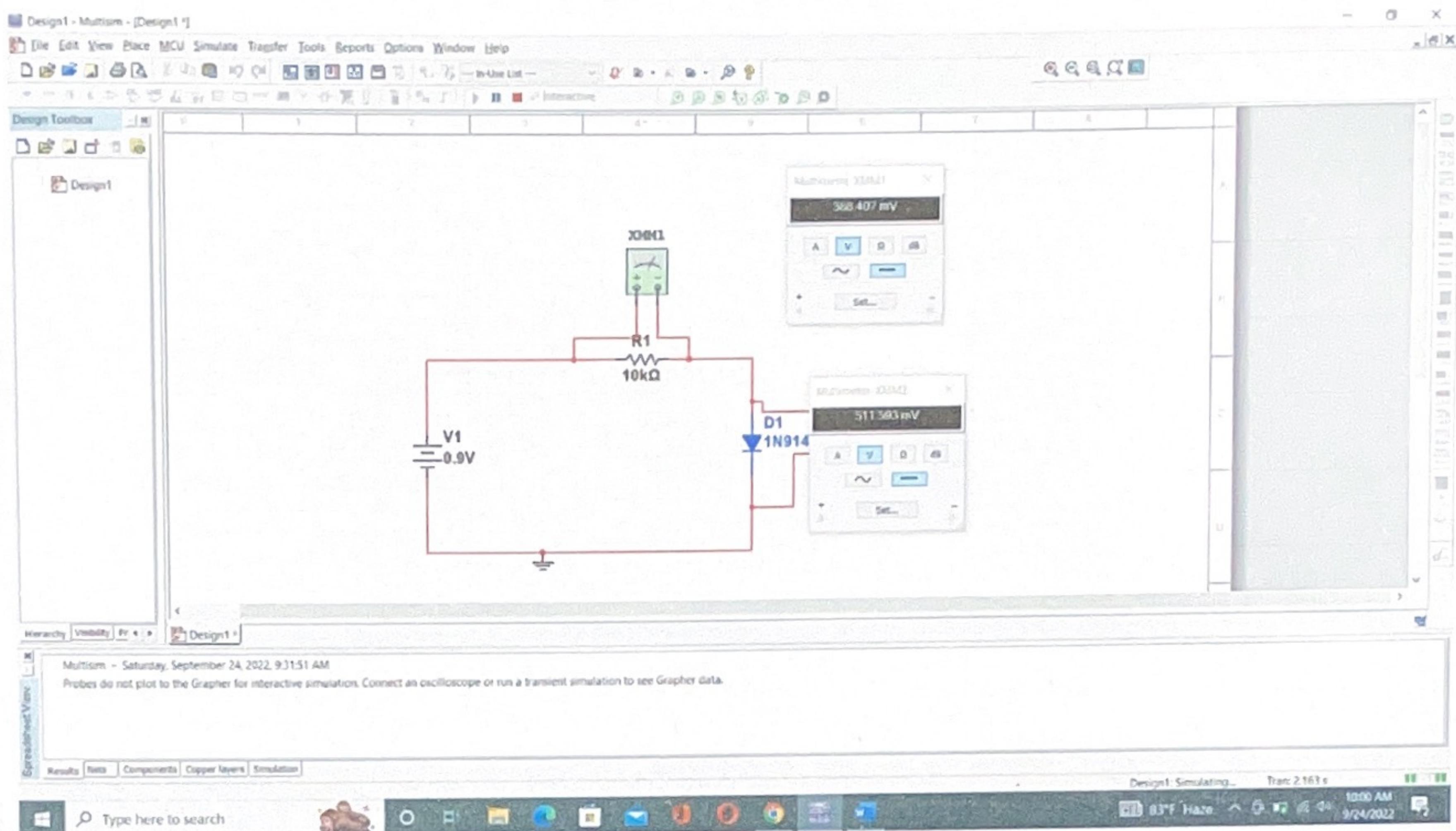
For 0.5v



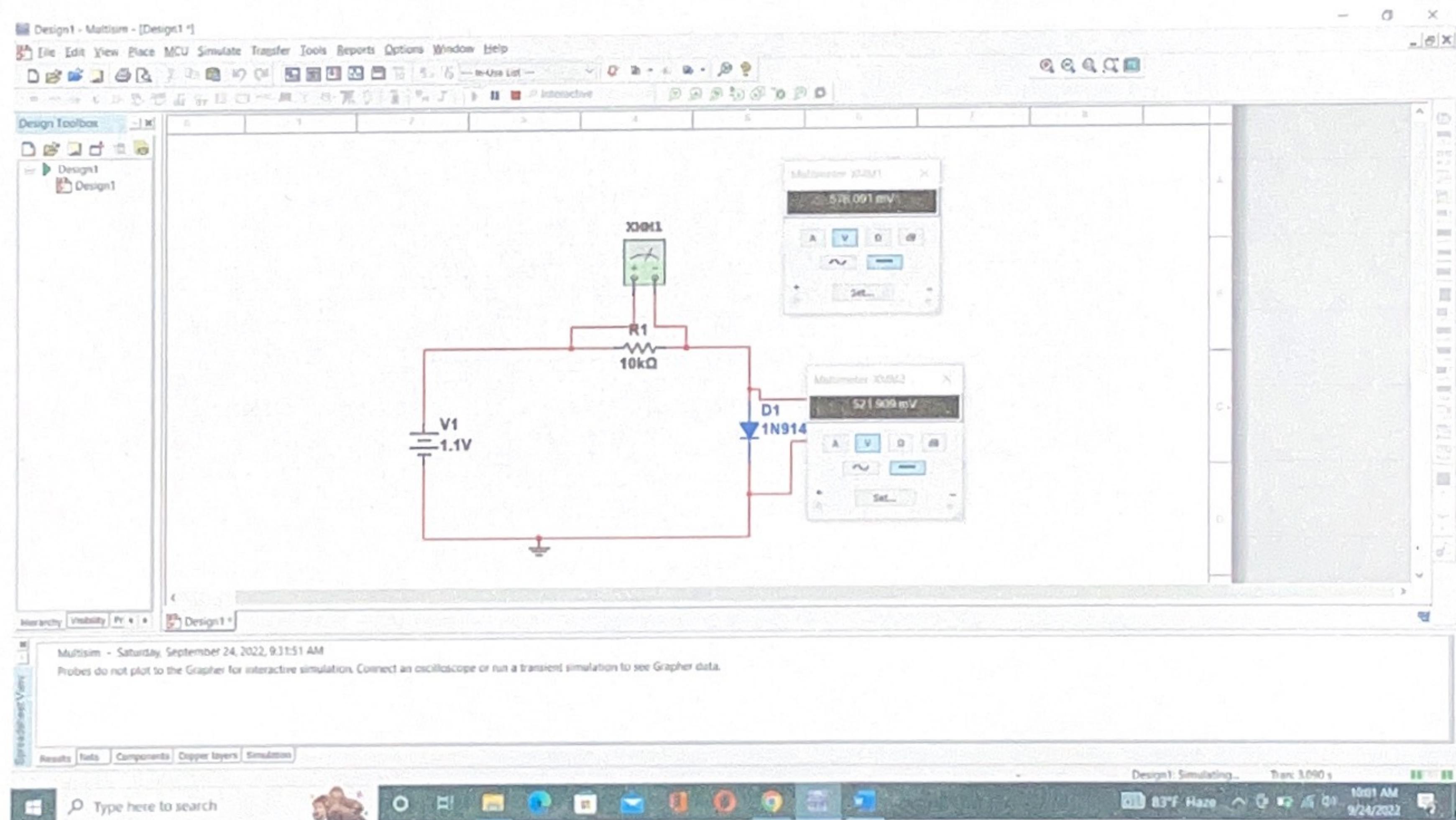
For 0.7v



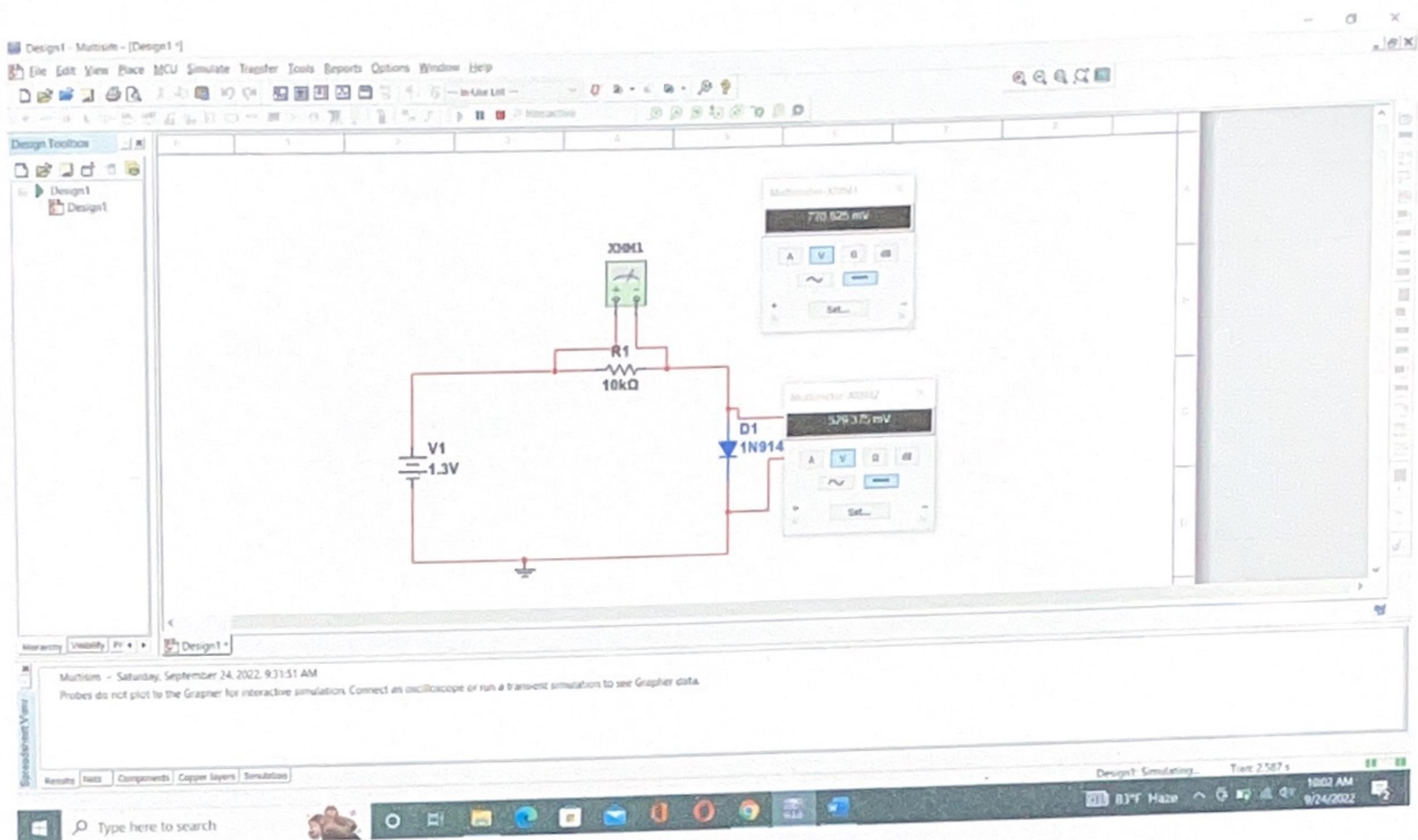
For 0.9v



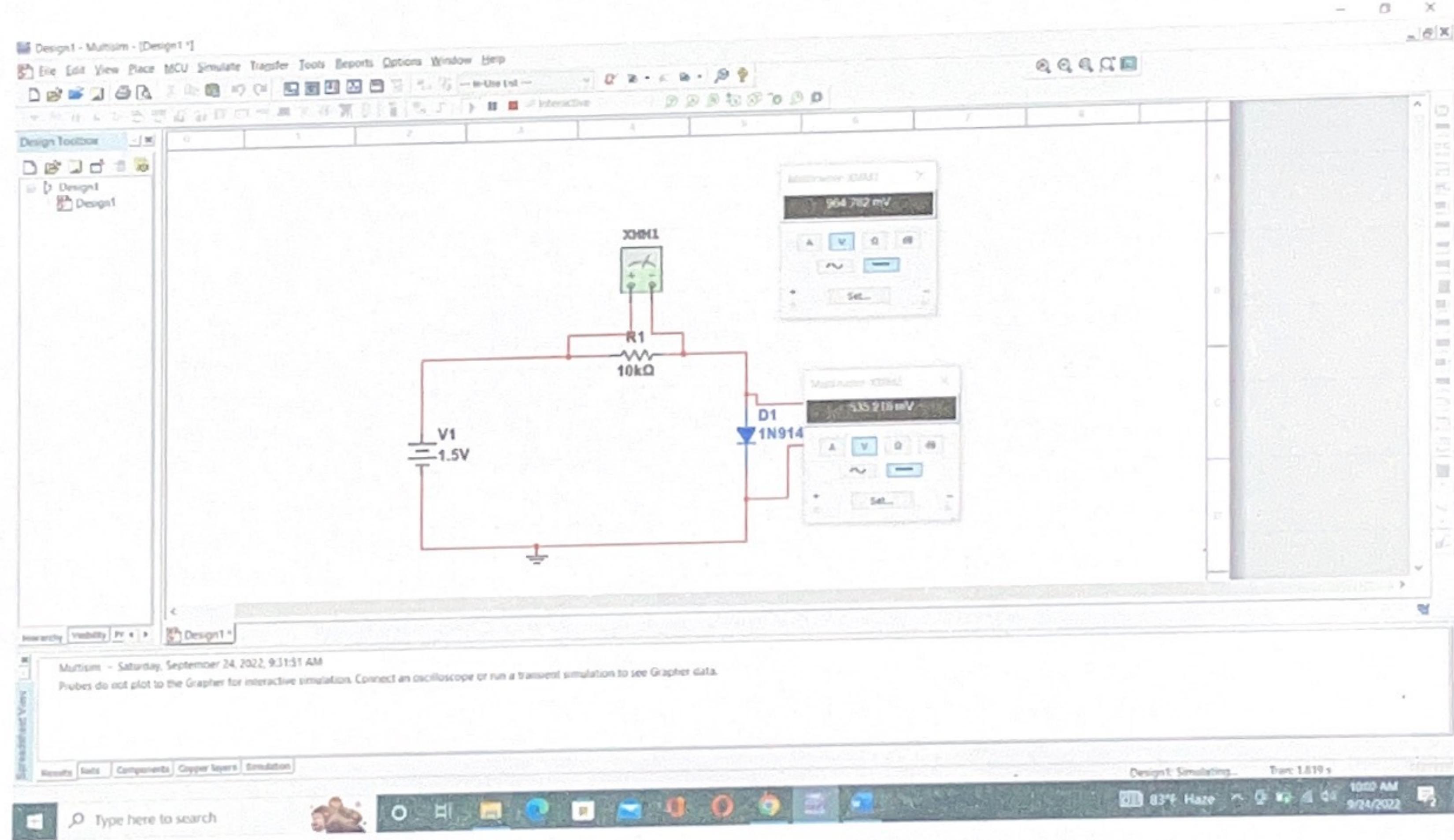
For 1.1V



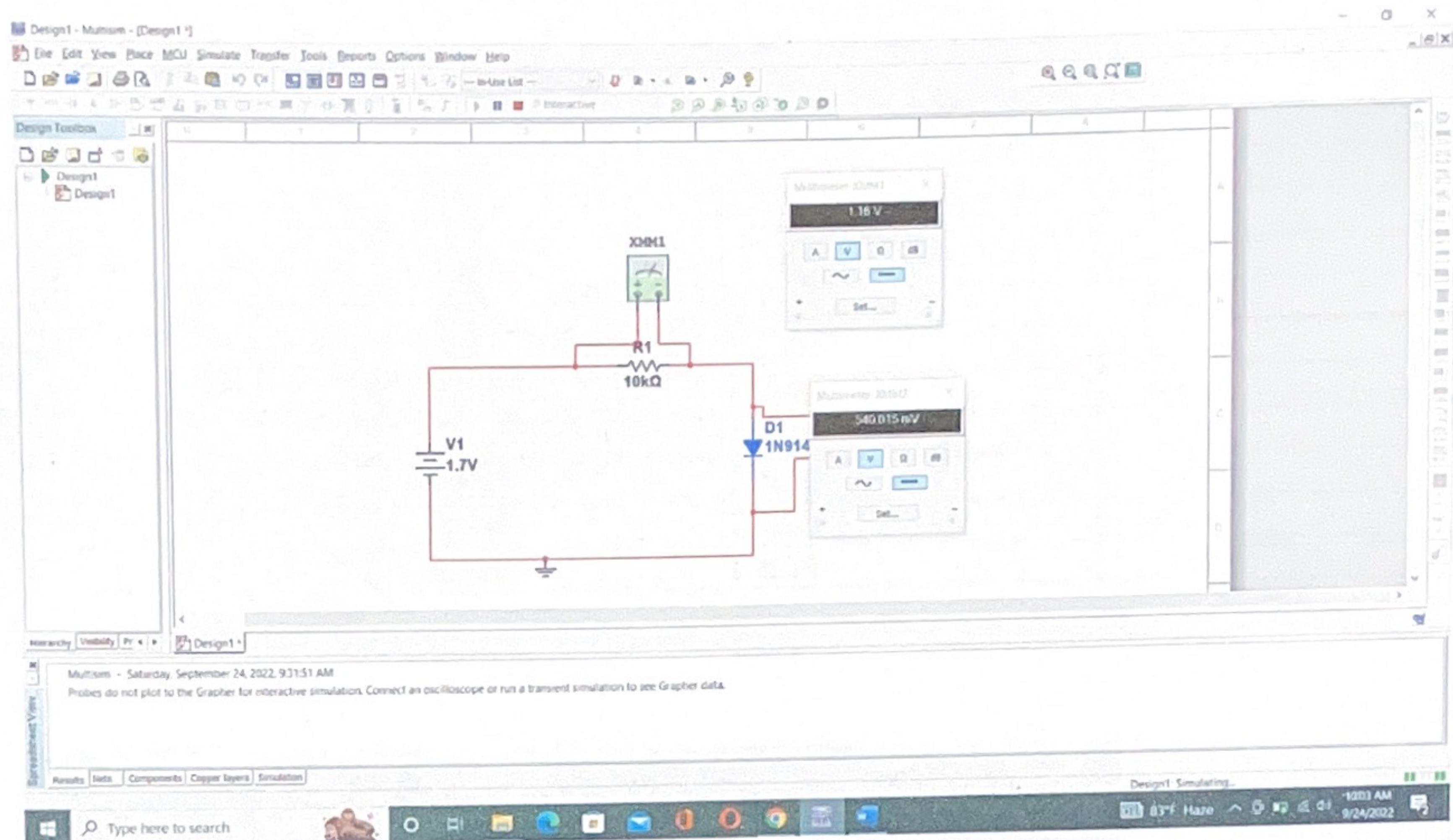
For 1.3V



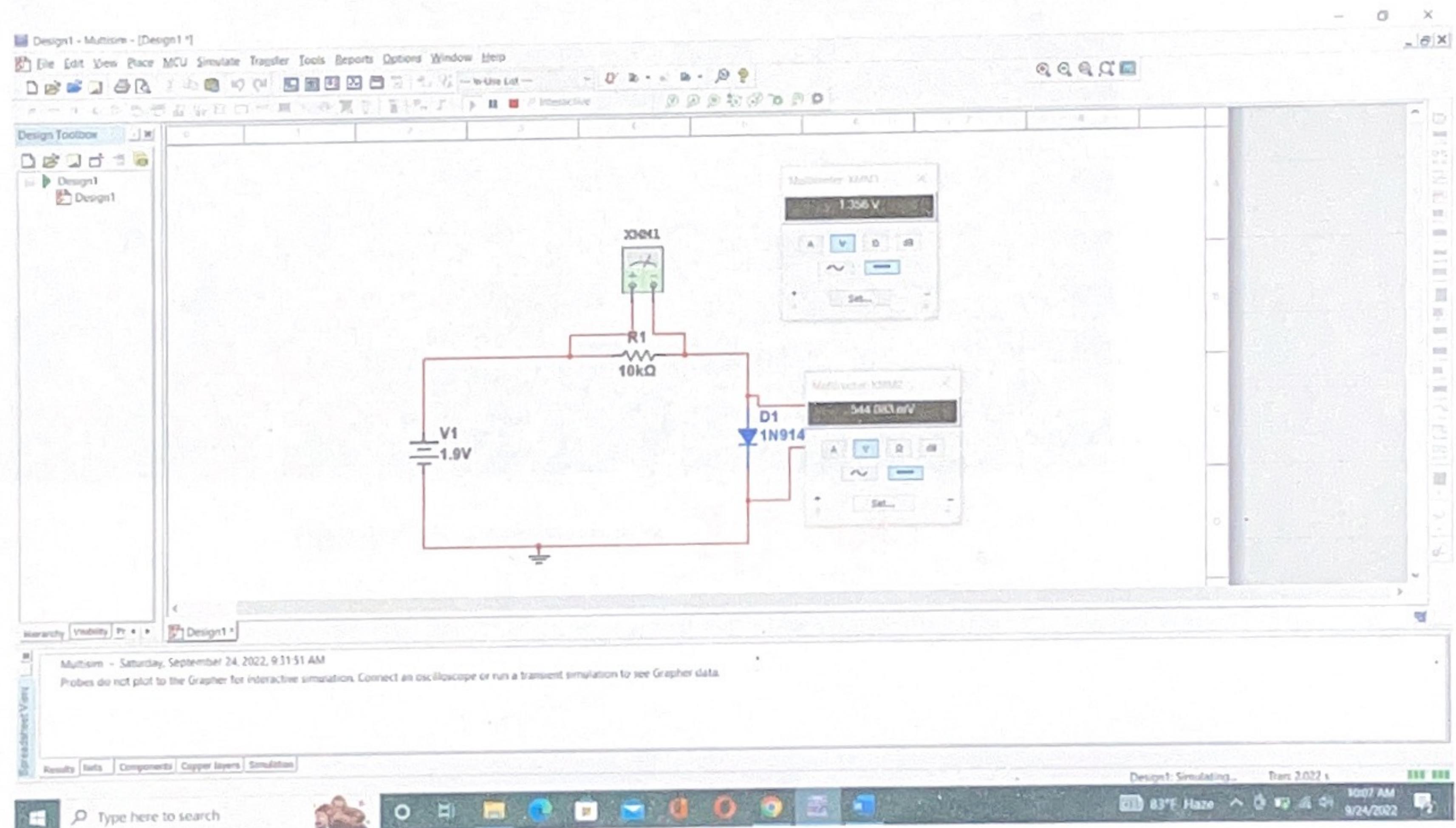
For 1.5V



For 1.7V



For 1.9V



Results:

Experimental data Table

V	VD	VR	ID
0	0	0	0
0.3	0.16	0.13	0.013
0.5	0.19	0.30	0.03
0.7	0.47	0.228	0.0228
0.9	0.64	0.25	0.025
1.1	0.82	0.28	0.028
1.3	0.99	0.30	0.03
1.5	1.13	0.31	0.031
1.7	1.16	0.33	0.033
1.9	1.356	0.54	0.054

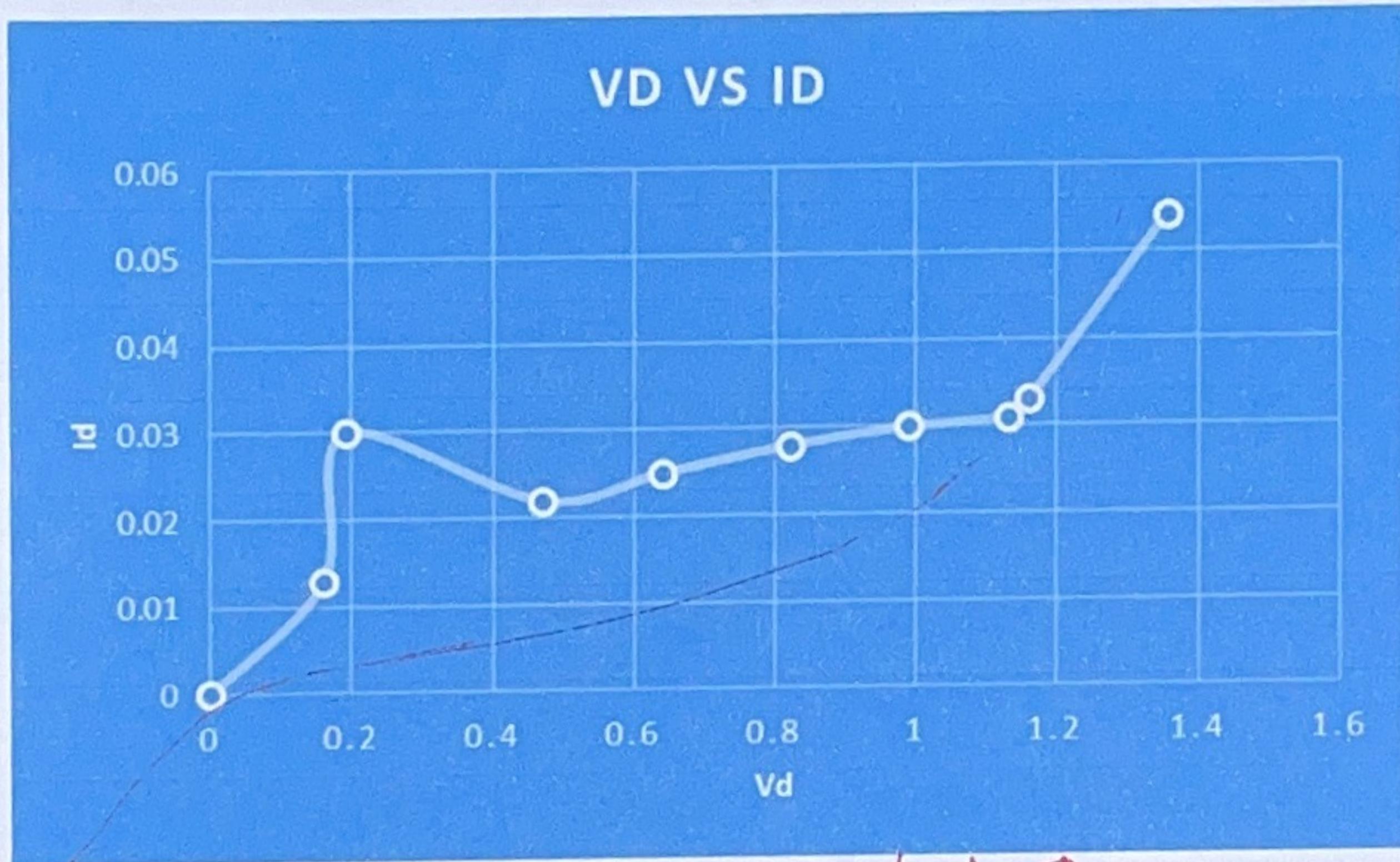


Figure: Characteristic curve

Y vs Id?

Diode junction and conduction

The characteristic curve of a junction diode is also called I-V curve. It is typically a graph showing the current flow at different voltages. The current is typically on the Y-axis and the voltage on the X-axis. The type of graph provides engineers with a visual record of the operating characteristics of components. The information enables them to use the component more appropriately.

Answering Question:

Ques 2: what will happen if the supply voltage polarity is reversed for the case of using a diode with PIV of 4.8v?

Answer:- If the supply voltage is more than 4.8v in reversed bias diode, it will break the circuit.

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