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Automation and Multiplexing of Picoamp Current Measurements of Single Molecule Devices NOLAN KING, KUO-YAO LIN, JASON SLINKER, University of Texas at Dallas — Performing precise measurement of current in nanoscale devices presents numerous challenges. Mechanical vibration, electromagnetic noise, and humidity in the atmosphere can each induce leakage current or noise in the measurement of high impedance devices. Additionally, the challenge of fabricating uniform devices makes developing automation difficult. Here, we utilized a silicon substrate equipped with an array of gold contacts to terminate the anode and cathode of numerous single molecule devices, a Keithley 6482 source-meter, a set of micromanipulator probes, and 3 ThorLabs DC controlled servos, along with a custom software solution to automate the acquisition of current measurements in the devices. The use of software controlled motors to reposition the substrate for measurement allowed for the automation of measurements of multiple devices at a time. The use of software controlled measurements allows for the practical acquisition of large sets of data, resulting in better trend analysis than manual measurement. We successfully automated multiple steps in the measurement process, and offer suggestions on further improvements to the cost and time burden of measuring electrical characteristics of nanoscale devices.

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