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Time-resolved Four-terminal probe of ion transport in Schefflera leaves[1] NICOLE PERIGO, GUOPING ZHANG, Department of Physics, Indiana State University — Plant growth relies on efficient ion transport. The rate of the ion transport depends on the concentration of each ion in the leaf. A common method is to use two-lead geometry. Here we employ a four-electrode set-up orienting the electrodes either parallel or perpendicular to each other. When the electrodes are parallel, two are at each end, with electric current running along the direction of the veins. When they are perpendicular, there are two along the direction of the veins (tip-tip) and two are perpendicular to the veins (side-side). The parallel set-up is similar to the Franck-Hertz experiment, but instead of using a vacuum tube we use a leaf. By using the parallel set-up, we find that two inner leads can directly control the movement of the ions in the time domain. By switching on/off the control current, a clear time-resolved current change is observed, where the signal decays less than one second. This time scale is similar to that of a typical ECG decay signal. Therefore, our method may be potentially a powerful tool to ion diffusion and transport in many biological and medical systems.

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