

# Development of On-Site Rapid Detection Device for Soil Macronutrients Based on Capillary Electrophoresis and Capacitive Coupled Contactless Conductivity Detection (C4D) Method

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## Appendix A. Supporting information

### Device fabrication

The schematic diagram of the device was shown in Figure S1, consisting of a capillary channel, platinum electrodes, a C4D detector, a high voltage system, a computer, etc. The device combined C4D and CE to rapidly measure the concentration of  $\text{NO}_3^-$ ,  $\text{NH}_4^+$ ,  $\text{H}_2\text{PO}_4^-$  and  $\text{K}^+$  in the soil extract. In each detection, the soil extract was first injected into the capillary channel filled with buffer solution by electrical injection. The high voltage system was connected to both ends of the capillary through platinum electrodes. After starting the electrophoresis, the ions in the soil extract could move toward the detector under the action of the electric field. Due to differences in migration rates, the ions would gradually separate into different ion groups and pass through the C4D detector in turn. The C4D detector measured the changes in conductivity and sent C4D signals to the computer via USB cable. The analysis software running on the computer recorded the data and calculated the concentrations of nutrient ions based on the peak areas.

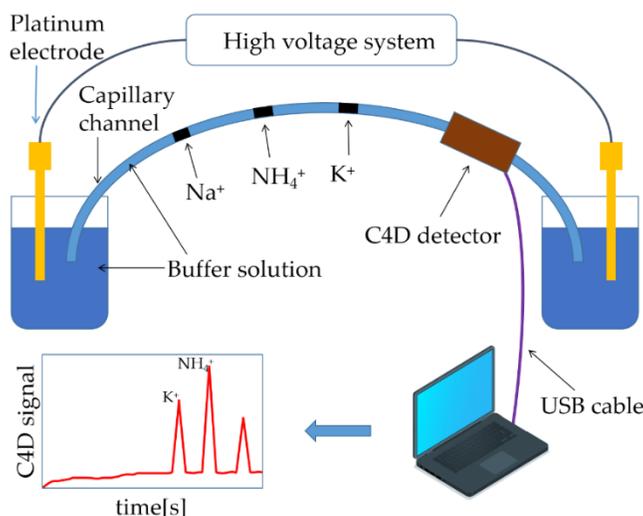


Figure S1. Schematic diagram of the device.