Stanford, February 13, 2012

To the Editor of the *Journal of Visualized Experiments - JoVE,*

Enclosed please find our manuscript and video entitled "**Time-lapse fluorescence imaging of Arabidopsis root growth with rapid manipulation of the root environment using the RootChip"**.

In this article we provide a detailed protocol for the use of the RootChip, the first fully integrated, fully valved perfusion and imaging platform for plant roots as it was used and recently published in Grossmann et al. 2011, *Plant Cell*.

The RootChip enables plant scientists to analyze multiple living roots under rapidly changing environmental conditions in real time and at cellular and subcellular resolution. This first-of-its-kind device will greatly advance research in an area that has largely been neglected due to the difficulty in accessing root growth and behavior using traditional approaches.

The major advantages of the RootChip are:

- Imaging of healthy roots with minimal human interference,
- Root growth on the imaging platform,
- Direct control over the root microenvironment with the possibility for rapid and reversible modification,
- Requirement for minimal volumes of media or test solutions even during experiments that last several days.

We successfully used the RootChip to monitor root growth on-chip using time-lapse fluorescence microscopy and to quantify nutrient flux in root cells using genetically encoded fluorescence sensors.

All authors have seen and approved the submission of the manuscript to *JoVE*. We declare that there is no conflict of interest with regard to the submission of this manuscript.

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Sincerely,

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