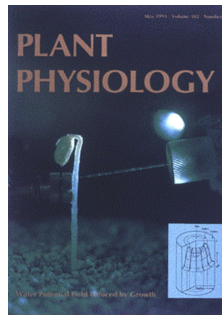


## Plant Biophysics/Biochemistry Research Laboratory

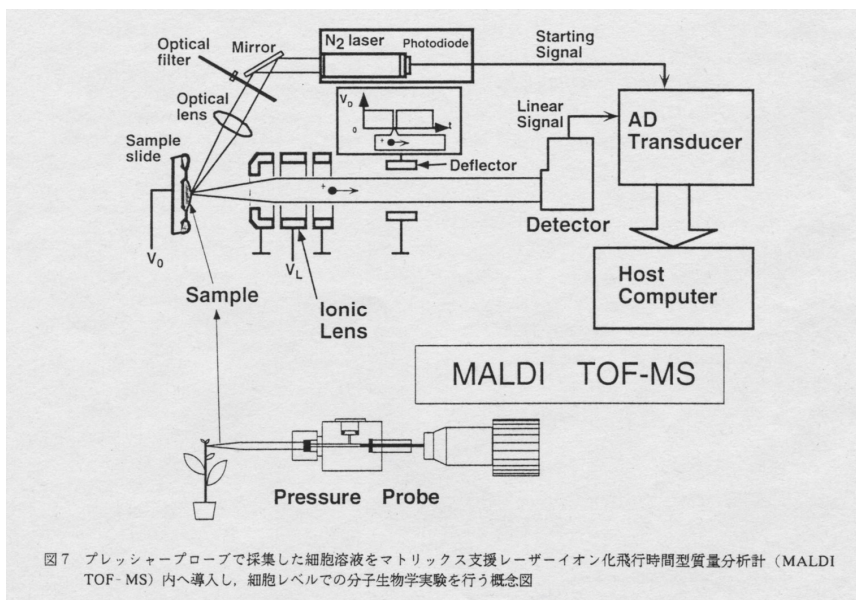
### | Laboratory History

Dr. Hiroshi Nonami, a former student of Dr. John S. Boyer moved from Delaware University, USA to Ehime University on October 1, 1988, and he was appointed to associate professor at the Department of Biomechanical Systems, Faculty of Agriculture. On April 1, 1990, Dr. Nonami was appointed to be a professor in the 'Plant Biophysics/Biochemistry Research Laboratory'.



Left) Dr. Nonami operates a cell pressure probe in early 1990's.  
Right) Nonami, H. and Boyer, J.S. (1993) Plant Physiology Cover image

In April, 1993, Dr. Nonami envisioned to combine plant water relations with mass spectrometry. And he began to collaborate with Dr. Rosa Erra-Balsells, an organic chemist at University of Buenos Aires.

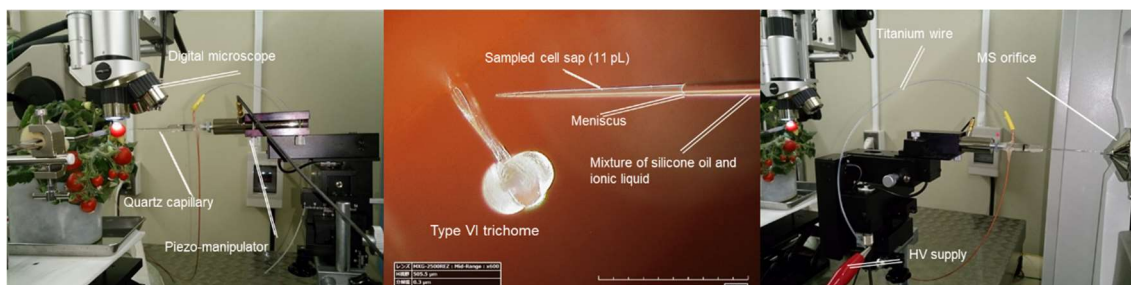


The picture of conceptual single-cell metabolome analysis combined a cell pressure probe with a mass spectrometer, MALDI TOF-MS generated by Dr. Nonami.



Dr. Boyer Symposium on Drought Tolerance at The Society for Experimental Biology in Barcelona in 2005. Dr. Nonami sat at the front of Dr. John S. Boyer, and Dr. Erra-Balsells sat the right of Dr. Nonami.

Over three decades, our laboratory has been studying cell water relations and metabolomics in plants. And consequently, the lab developed powerful analytical methods performable at single cells by independently combining a plant cell water status instrument, known as 'Cell Pressure Probe', with two mass spectrometers, 'Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometry (MALDI-TOF MS)' and 'Electrospray Ionization Orbitrap-Mass Spectrometry (ESI-Orbitrap MS)' widely used. The latter single-cell metabolomics is called, 'picoliter Pressure-Probe Electrospray-Ionization Mass Spectrometry (picoPPESI-MS)', which was developed in 2016. Since then, picoPPESI-MS analysis has been demonstrated to be a powerful method directly performable in intact plant cells.



Workflow of single-cell metabolomics, called, 'picoliter Pressure-Probe Electrospray-Ionization Mass Spectrometry (picoPPESI-MS)'. Reprinted with permission from Nakashima *et al. Anal. Chem.* 2016, 88, 3049-3057. Copyright © 2016, American Chemical Society

Dr. Nonami retired in March, 2020. In April, 2020, he was granted the title of Professor Emeritus in Ehime University, and Dr. Hiroshi Wada moved from Kyusyu Okinawa Agricultural Research Center of the National Agriculture and Food Research Organization, Japan to Ehime University to take up the professor position in 'Plant Biophysics/Biochemistry Research Laboratory'.

For the mid-term objective, the laboratory aims to further improve picoPPESI-MS and use it to better understand cellular heterogeneity in a whole range of physiological processes in plants including ripening, pollination, and fruit development.

| Contact

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