

## Fluorescence imaging of living plants for analysis of environmental stresses

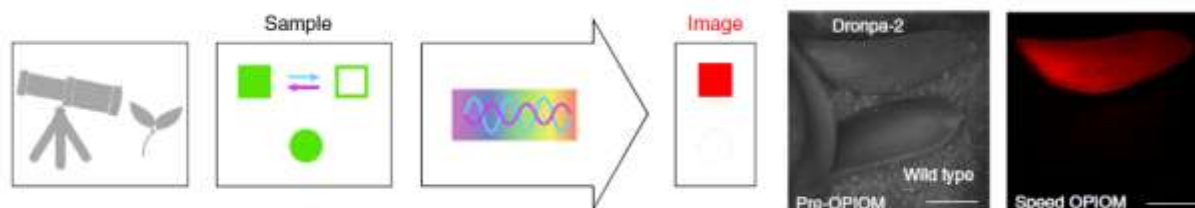
Ruikang Zhang<sup>1,2\*</sup>, Thomas le Saux<sup>1,2</sup>, Ludovic Jullien<sup>1,2</sup>

1. PASTEUR, Département de chimie, École normale supérieure, UPMC Univ. Paris 06, CNRS, PSL Research University, 75005 Paris, France

2. Sorbonne Universités, UPMC Univ. Paris 06, École normale supérieure, CNRS, PASTEUR, 75005 Paris, France

\*[ruikang.zhang@ens.fr](mailto:ruikang.zhang@ens.fr)

Environmental monitoring is widely used in Agriculture to analyze the physiological states of plants and detect different environmental stresses. Optical analysis of the endogenous fluorescence emission is proved to be a practical method to monitor the stress situation of the plants. However, engineered sensing plants in which expression of fluorescent proteins is controlled by a variety of stress-inducible promoters have open an alternative avenue. We have developed a remote sensing prototype based on the OPIOM<sup>1</sup> protocol, which exploits reversibly photoswitchable fluorescent proteins (RSFP) as fluorescent labels. This observation device exploits three modulated lights at 408, 480, and 550 nm to illuminate the leaf and acquires the fluorescence signals. The specific information from the RSFP of interest is then selectively extracted and the expression level of the RSFP is quantified. This strategy has been demonstrated to selectively discriminate RSFP-labeled plants from other autofluorescent plants, even under ambient light .



### Reference:

Jérôme Quérard, Ruikang Zhang, Zsolt Kelemen, Marie-Aude Plamont, Xiaojiang Xie, Raja Chouket, Insa Roemgens, Yulia Korepina, Samantha Albright, Eliane Ipendey, Michel Volovitch, Hanna L. Sladitschek, Pierre Neveu, Lionel Gissot, Arnaud Gautier, Jean-Denis Faure, Vincent Croquette, Thomas Le Saux & Ludovic Jullien, Resonant out-of-phase fluorescence microscopy and remote imaging overcome spectral limitations, nature communications | 8: 969