

Title: Field Sensors for Plant Disease and Stress Monitoring

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Abstract: Determination of plant diseases and stresses is currently dependent on time-consuming and complicated measurement technologies that are usually performed in centralized laboratories, which is inadequate for early detection and rapid responses. Recently, we demonstrated a set of miniaturized sensor devices that can perform molecular diagnosis of plant pathogens or monitoring of plant stresses directly in the field. The sensor platforms include a microneedle-smartphone device for performing rapid DNA/RNA extraction and isothermal amplification, and noninvasive volatile organic compound (VOC) sensors based on smartphone or wearable sensor patches. These cost-effective sensors have been thoroughly tested in greenhouse for the detection of a range of tomato pathogens, such as *Phytophthora infestans*, *Alternaria linariae*, and Tomato spotted wilt virus (TSVW) with high detection accuracy. Together, these sensor devices demonstrated the feasibility of in-field detection of plant diseases and stresses of great concern.

Bio:

Qingshan Wei is an assistant professor in the Department of Chemical and Biomolecular Engineering, and a member of the Emerging Plant Disease and Global Food Security Cluster at NC State. He received his Ph.D. degree in Chemistry from Purdue University in 2012, and completed postdoctoral training in the Departments of Electrical Engineering and Bioengineering at UCLA between 2012-2016. His research interests focus on developing novel diagnostic assays and sensors for point-of-care detection of human and plant diseases. He is the recipient of the Goodnight Early Career Innovator Award (2023), NSF CAREER Award (2020), and *Nano Research* Young Innovator Award in NanoBiotech (2018)