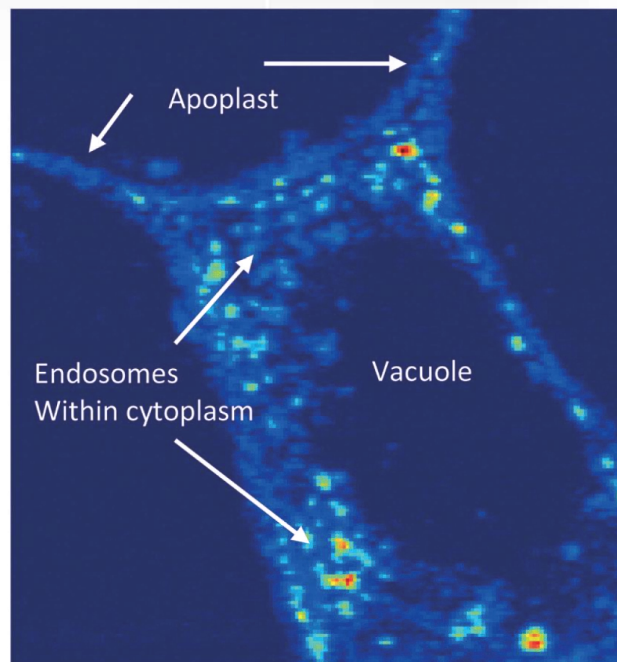


A Nanomaterial's Journey through a Tomato Plant



This 60 nm resolution x-ray fluorescence image was taken from the stele of the root of a plant that was exposed to functionalized CeO₂. The brighter areas show the highest concentration of Ce within the apoplast and within endosomes.

J. Li, R. V. Tappero, A. S. Acerbo, H. Yan, Y. Chu, G. V. Lowry, J. M. Unrine. *Environ. Sci.: Nano* **6**, 273 (2019).

Work was performed in part at Brookhaven National Laboratory

Scientific Achievement

Scientists revealed how a manufactured nanomaterial (MNM) based on Ce travels through a tomato plant on a subcellular level.

Significance and Impact

This study will enhance our ability to predict how properties of MNM such as CeO₂ – used in rechargeable batteries – influence the uptake, transformation, and transfer of nanomaterials in terrestrial food webs.

Research Details

- Mechanisms of functionalized CeO₂ entry into tomato roots and translocation within the plants were examined using X-ray nano- and microprobes at NSLS-II HXN and SRX beamlines and APS beamline 13-ID-E
- Plant growth and Ce concentration in tissues were found to be functions of surface charge and translocation, which were greater for negatively charged CeO₂ than positive or neutral CeO₂.