What Color are Your Chile Peppers?
Distinguishing Carotenoids in Living Organisms and Tissue

Scientific Achievement
Subcellular discrimination and relative quantification of multiple carotenoid pigments in vivo

Significance and Impact
This work and the associated enabling Raman microscopy technology provides a significant increase in the fundamental understanding of carotenoid biosynthesis. Carotenoids are intertwined in a variety of biological pathways, thus this work broadly impacts diverse field such as
– Dietary health and nutrition
– Biofuels and bioenergy

Research Details
– Hyperspectral confocal Raman microscopy provides chemical resolution of 5 carotenoids in intact, mature chile pepper tissue
– Differential localization of carotenoids to chromoplast and lipid bodies is species specific and correlated with chromoplast structure
– Pigment results confirmed by HPLC and ultrastructure examined by TEM and SEM.


Raman microscopy and spectral image analysis was performed at Sandia National Laboratories as part of PARC.