



Topical Research Meeting on Physics in Food Manufacturing

(P2) Testing a new analytical approach to detecting non-volatile molecular isomers in food: Combining lasers and mass spectrometry for identifying stilbenes

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Resveratrol and piceatannol are phytoalexins, a natural compound found in many plants and foods including red grapes, and peanuts. These stilbene compounds are attracting increasing attention as food constituents and supplements due to their unique properties against diseases, including heart disease and some cancers. The Recent investigation further revealed that cis-stilbenes were more potent cytotoxic agents in tumour cells than trans-stilbenes. Therefore, there is increasing interest in developing quantitative analytical methods based on mass spectrometry to determine the structural isomers of stilbenes. This is of critical importance in determining the relative population of one naturally occurring active structural isomer over the other when comparing the presence of these chemicals in food and plant material.

In this proof-of-concept investigation, we have attempted to spectroscopically identify the isomers of stilbenes by using our new and unique laser mass spectroscopy technique. We obtained action spectra and photodissociated fragment ion mass spectra between the trans- and cis-isomers (dimethyl trans-stilbene-4,4'-dicarboxylate and Dimethyl cis-stilbene-4,4'-dicarboxylate) and observed significant spectra differences in between these isomers. We also obtained information on the UV photochemical degradation of these molecules. Results of this study demonstrated the utility of our new instrument in performing rapid mass and UV spectroscopic identification of small molecule isomers through spectral differentiation of structurally close isomers. More broadly, we demonstrated the utility of our new instrument in the field of food science and food adulteration.