



**Safety
Quality
Traceability**



FONDAZIONE
EDMUND MACH
dal 1874

3rd ISO-FOOD Symposium

San Michele all'Adige

Trentino-Alto Adige, Italia

13 – 15 May 2026

BOOK OF ABSTRACT



P06. Isotopic application of the Orbitrap Exploris 480: a case study on curcumin

Silvia Pianezze

¹Silvia Pianezze, ²Domenico Masuero, ²Roberto Penasa, ¹Matteo Perini, ²Alberto Roncone, ²Luana Bontempo

¹Technology Transfer Center, Fondazione Edmund Mach, San Michele all'Adige, Italy

²Research and Innovation Center, Fondazione Edmund Mach, San Michele all'Adige, Italy

Orbitrap Exploris 480; Curcumin; carbon isotopic ratio

In the present work, the Orbitrap Exploris 480 has been applied for the isotopic measurement of curcumin in curcuminoids samples of natural (7), synthetic (6) and unknown (4) origin. Together with carbon isotopic ratio ($\delta^{13}\text{C}$), $^{13}\text{C}^{13}\text{C}$ clumped isotopic values ($\delta^{13}\text{C}^{13}\text{C}$) were also considered, giving first reference values for this parameter. The isotopic abundances were measured both in curcumin molecules (through an M0 experiment) and in four major fragments (through a MS² experiment). Mean $\delta^{13}\text{C}_{\text{VPDB}}$, Orbi values of $-31.3 \pm 1.0\text{‰}$ and $-27.9 \pm 1.9\text{‰}$ were obtained for natural and synthetic samples. As for the clumped isotopes, whose isotopic values are calculated against the standard selected for the present study, mean $\delta^{13}\text{C}^{13}\text{C}_{\text{STND}}$, Orbi of $-3.2 \pm 3.5\text{‰}$ and $+3.2 \pm 4.6\text{‰}$ were obtained for natural and synthetic samples, respectively. The $\delta^{13}\text{C}_{\text{VPDB}}$, Orbi and $\delta^{13}\text{C}^{13}\text{C}_{\text{STND}}$, Orbi of curcumin were linearly correlated (Pearsons' coefficient = 0.93) and they were effective in the discrimination between natural and synthetic samples ($p < 0.05$). Fragmentation experiments gave the opportunity to further investigate the isotopic distribution along curcumin structure, while the $\delta^{13}\text{C}_{\text{STND}}$, Orbi and $\delta^{13}\text{C}^{13}\text{C}_{\text{STND}}$, Orbi of most fragments were statistically different between natural and synthetic samples ($p < 0.05$). The combination of the results obtained through the M0 and the MS² experiments provided a promising tool for curcumin authentication.