Electronic Supplementary Material (ESI) for Analyst.

Towards food analytics: fast estimation of lycopene and β-carotene content in tomatoes based on surface enhanced Raman spectroscopy (SERS)

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Supplementary information

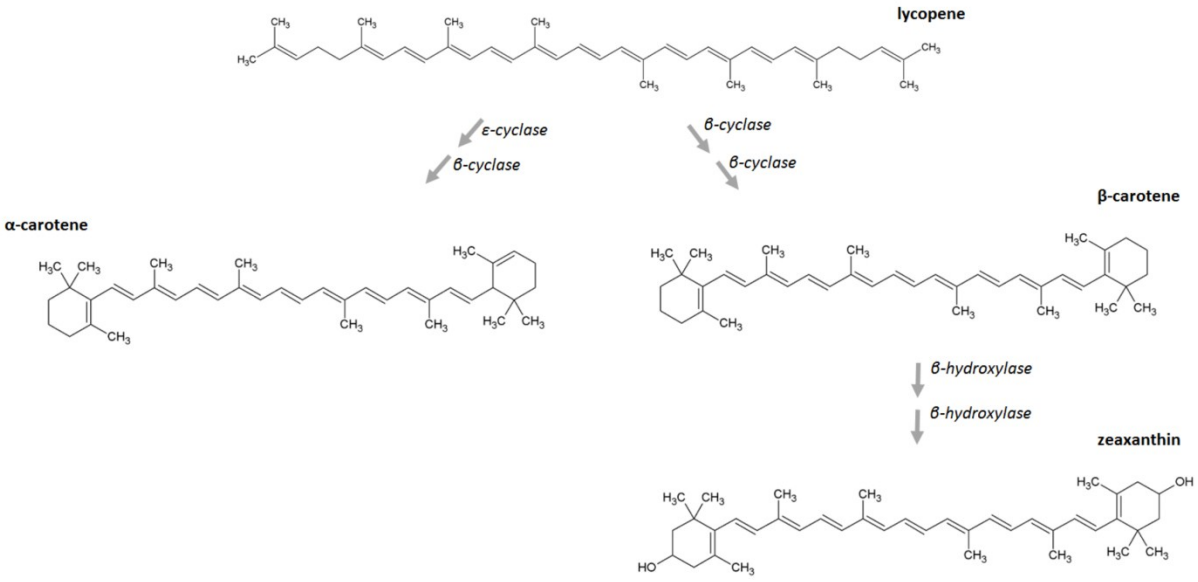

Figure S1 Simplified scheme for conversion of lycopene to β-carotene and then to zeaxanthin. For a more detailed and complete pathway please see G. A. Armstrong *et al*.[1] and J. Hirschberg.[2]

[1] G. A. Armstrong, J. E. Hearst, FASEB J. 10 (2), 1996, 228–37

[2] J. Hirschberg, Current Opinion in Plant Biology, 4 (3), 2001, 210–218

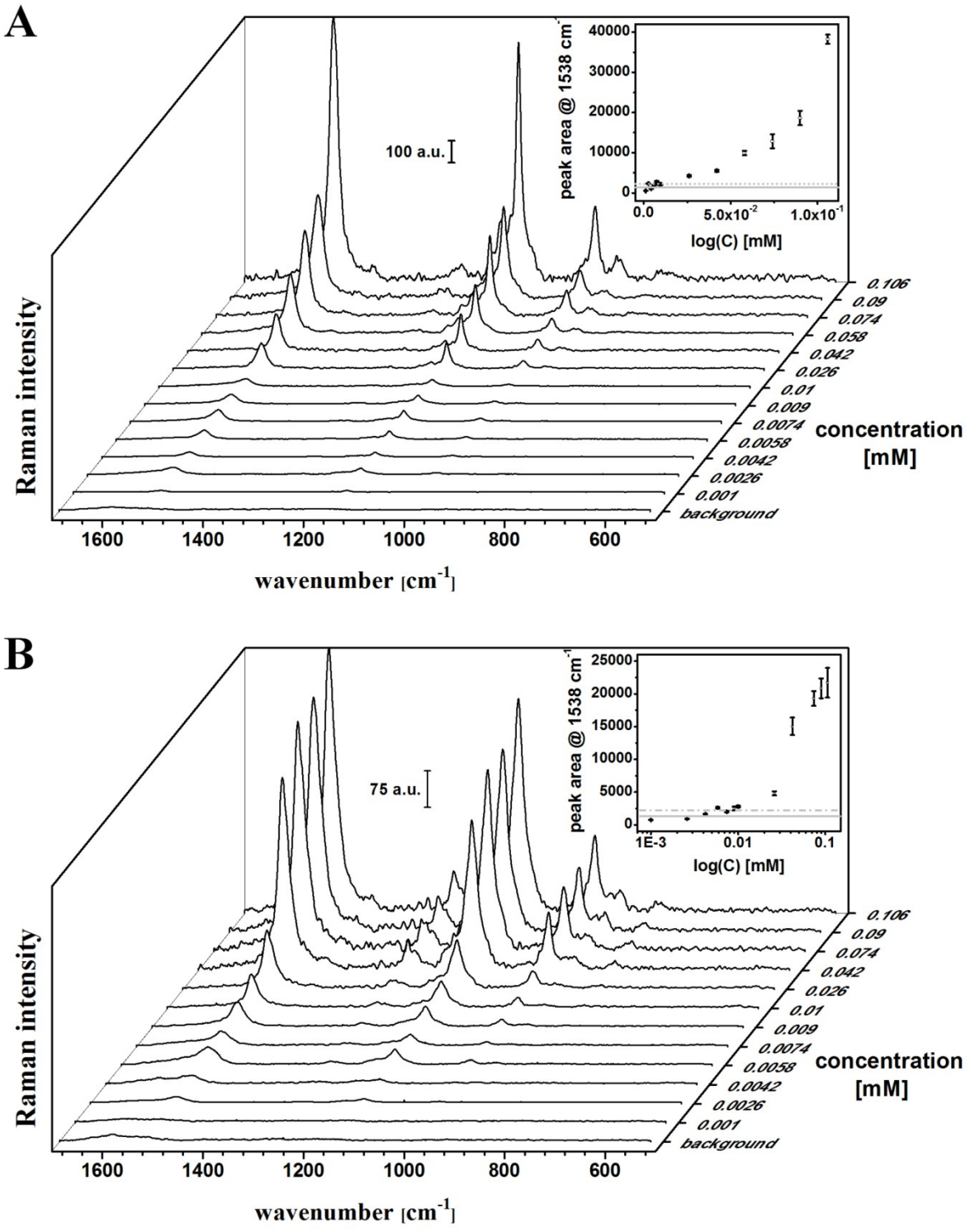

Figure S2 Concentration dependent SERS spectra of β-carotene (A) and lycopene (B). In the inset of the figures, normalized and integrated peak area of the Raman peak at 1538 cm^{-1} for β-carotene (A) and lycopene (B) are plotted. Please note that the presented measured data include the standard error of the mean of the obtained experimental values. The signal of the blank is marked by a continues gray

line and the limit of detection (equal to the signal of the blank plus three times the standard deviation of the blank) is marked as a gray dotted line.

Table S1. Percentages of the two analytes in the mixture solution and afferent concentration of each analyte in the measured solution. The concentrations of β-carotene and lycopene that are lower than the estimated detection limit of the analytes measured individually are marked in italic

β-carotene		**lycopene**	
%	**μM**	**%**	**μM**
0	*0*	100	100
8	*8*	92	92
16	*16*	84	84
24	*24*	76	76
32	32	68	68
40	40	60	60
48	48	52	52
56	56	44	44
64	64	36	36
72	72	28	28
80	80	20	20
88	88	12	12
96	96	*4*	*4*
100	100	*0*	*0*

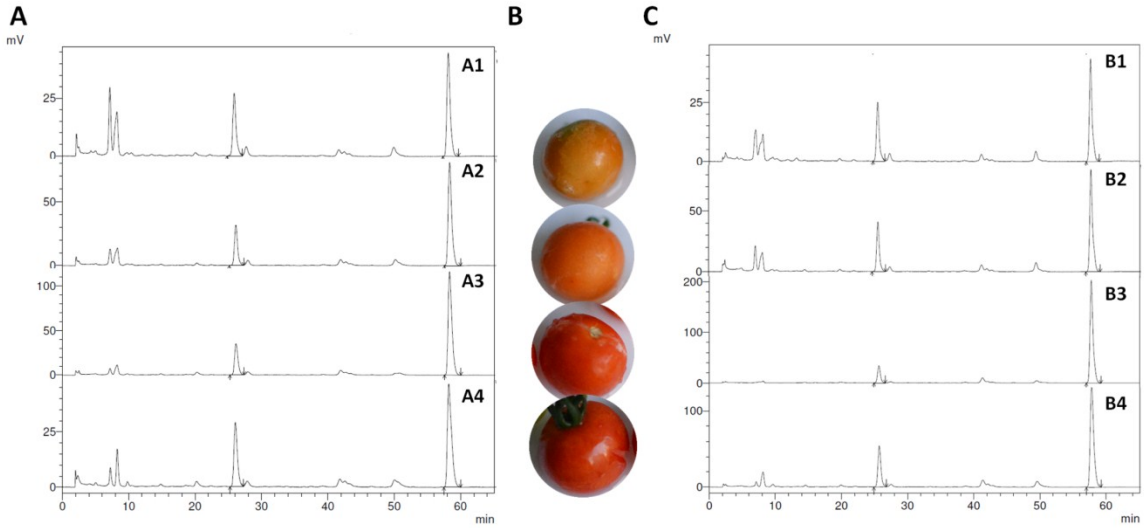

Figure S3 HPLC chromatograms obtained for the plant ripening tomatoes series (A), the lab-ripening tomato series (C) and sample picture of the colors the tomatoes had when analyzed (B). The HPLC chromatographs in reveal well separated peaks at different retention times. Namely, 24.85 min assigned to β-carotene and 57 min assigned to lycopene. **Table 1** presents the amounts of these two carotenoids found in the samples upon the.