Commercially available carrageenans show broad variation in their structure, composition, and functionality

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Tab. S1: Primer sequences used for gene amplification for ligation-independent cloning.

Gene locus	Primer	Primer sequence (5' → 3')
ZGAL_236	forward	TACTTCCAATCCATGCAACAACCTACGAAGACTTCAAATCCGAAC
	reverse	TATCCACCTTTACTGTTACTCCACGAGTATCTTTTTTGAAACCTCTCC
ZGAL_4265	forward	TACTTCCAATCCATGGTTCCAACTGAATTGAGGGCCG
	reverse	TATCCACCTTTACTGTCAGTTACACGAAGTAATACTACCTAGATTTTGGTTAC

Tab. S2: Molecular weight and polydispersity (determined by HPSEC-RI/MALLS) of the carrageenans used in this study.

Sample	M_W, kDa	Polydispersity index
KC1	1013 ± 35	1.9
KC2	965 ± 23	2.3
KC3	925 ± 25	1.7
IC1	999 ± 16	1.9
IC2	621 ± 25	2.3
IC3	523 ± 61	1.7
IC4	866 ± 5	1.8
IC5	915 ± 3	2.0
LC1	923 ± 8	2.0
LC2	641 ± 9	1.8
LC3	1787 ± 18	2.0
LC4	1499 ± 2	2.2
LC5	821 ± 13	1.7
LC6	1081 ± 26	2.7
C1	1158 ± 21	2.1
C2	886 ± 30	2.0

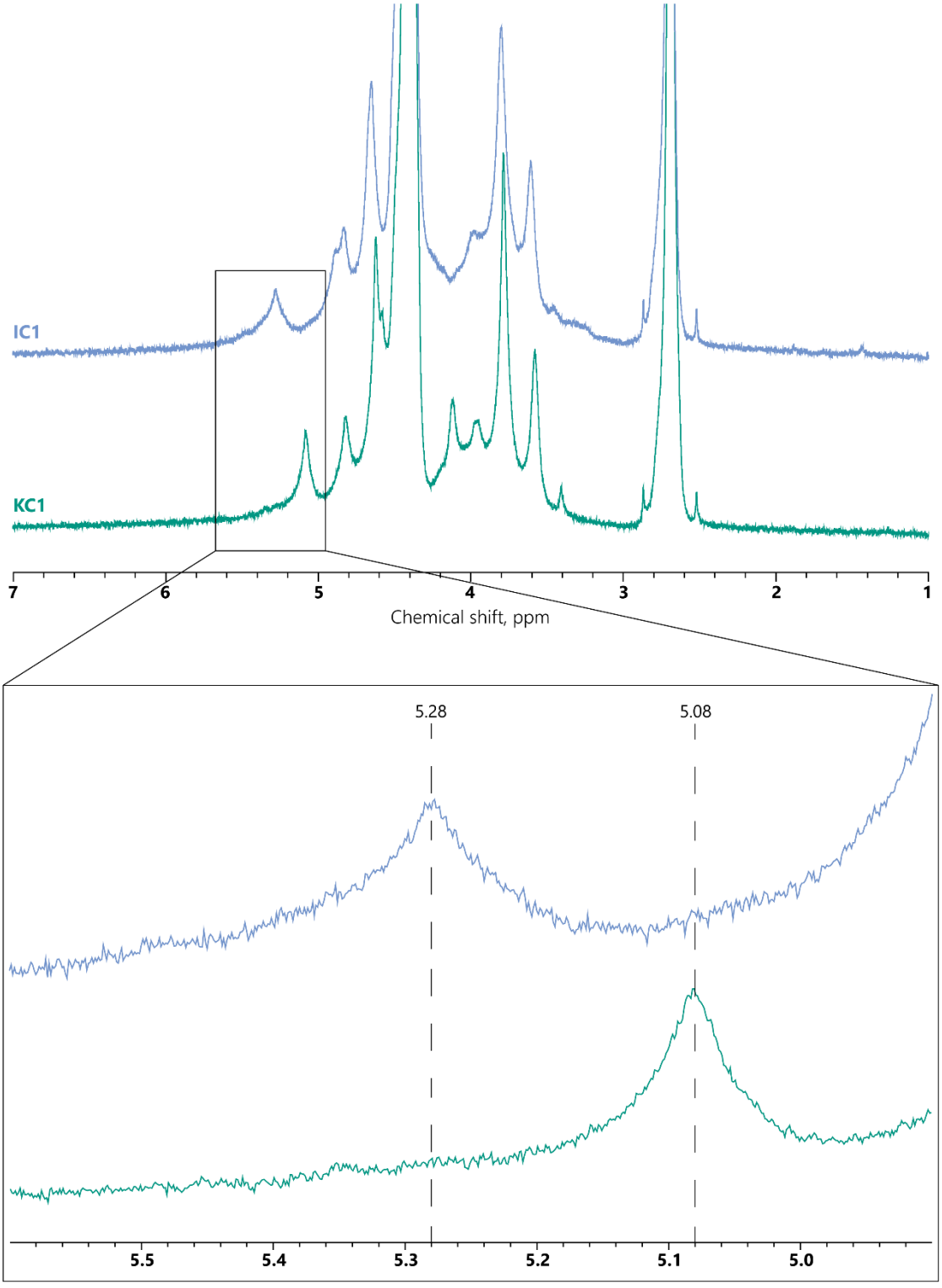

Fig. S1: ^{1}H NMR spectra of the commercial carrageenans KC1 and IC1.

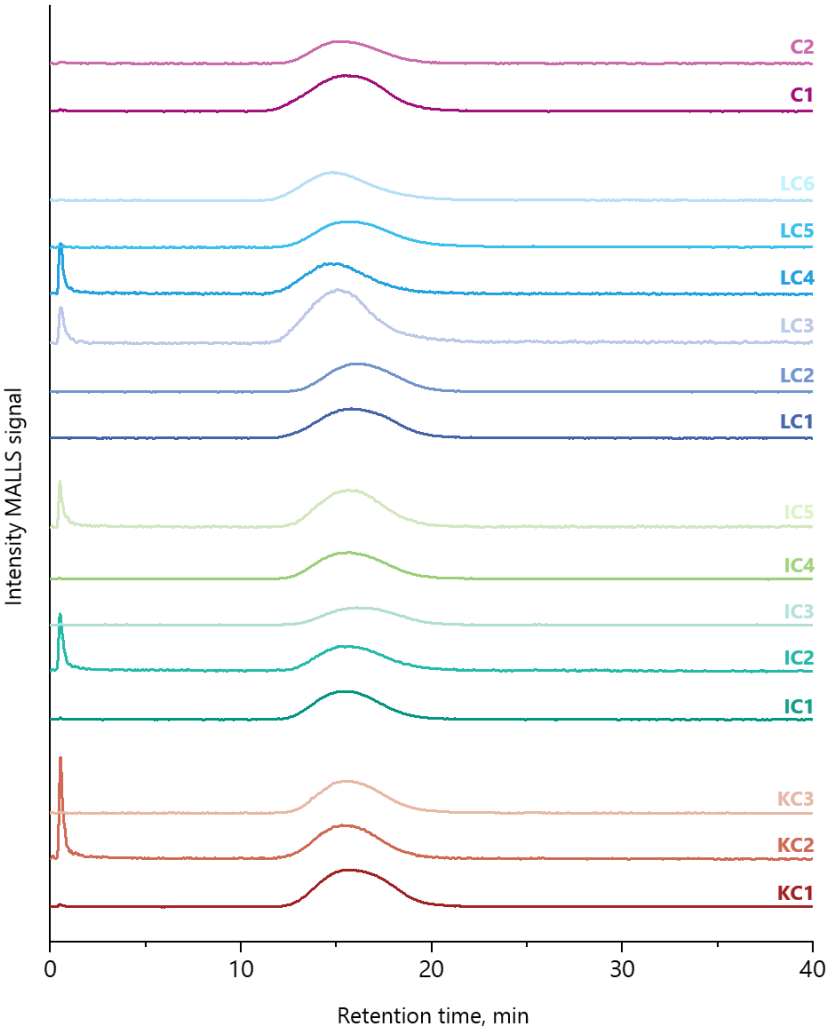

Fig. S2: HPSEC-MALLS chromatograms of the commercial carrageenans used in this study.

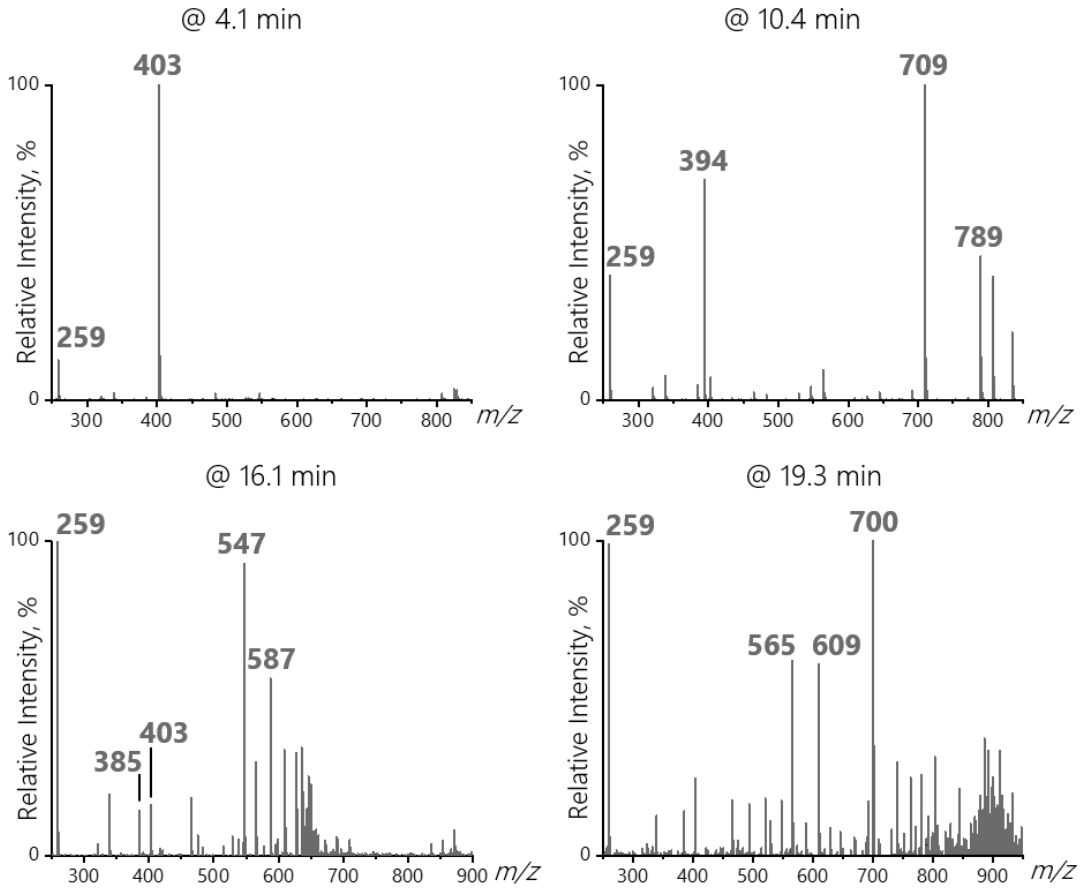

Fig. S3: Mass spectra of the oligosaccharides enzymatically released from KC1 after κ-carrageenase treatment. The analysis was conducted using HPLC-MS in negative full scan mode. The retention times of the oligosaccharides are indicated above the mass spectra.

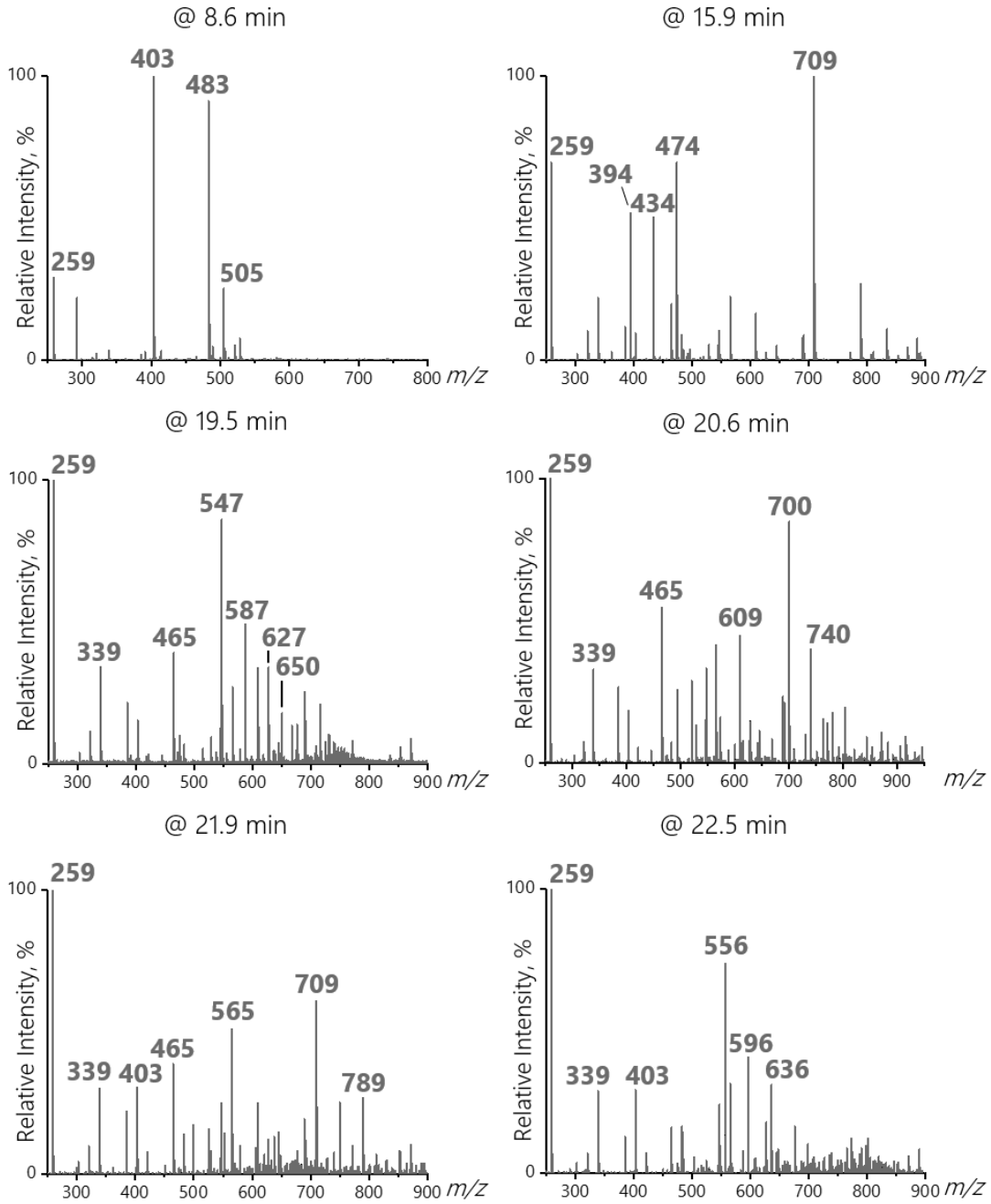

Fig. S4: Mass spectra of the oligosaccharides enzymatically released from IC1 after ι-carrageenase treatment. The analysis was conducted using HPLC-MS in negative full scan mode. The retention times of the oligosaccharides are indicated above the mass spectra.

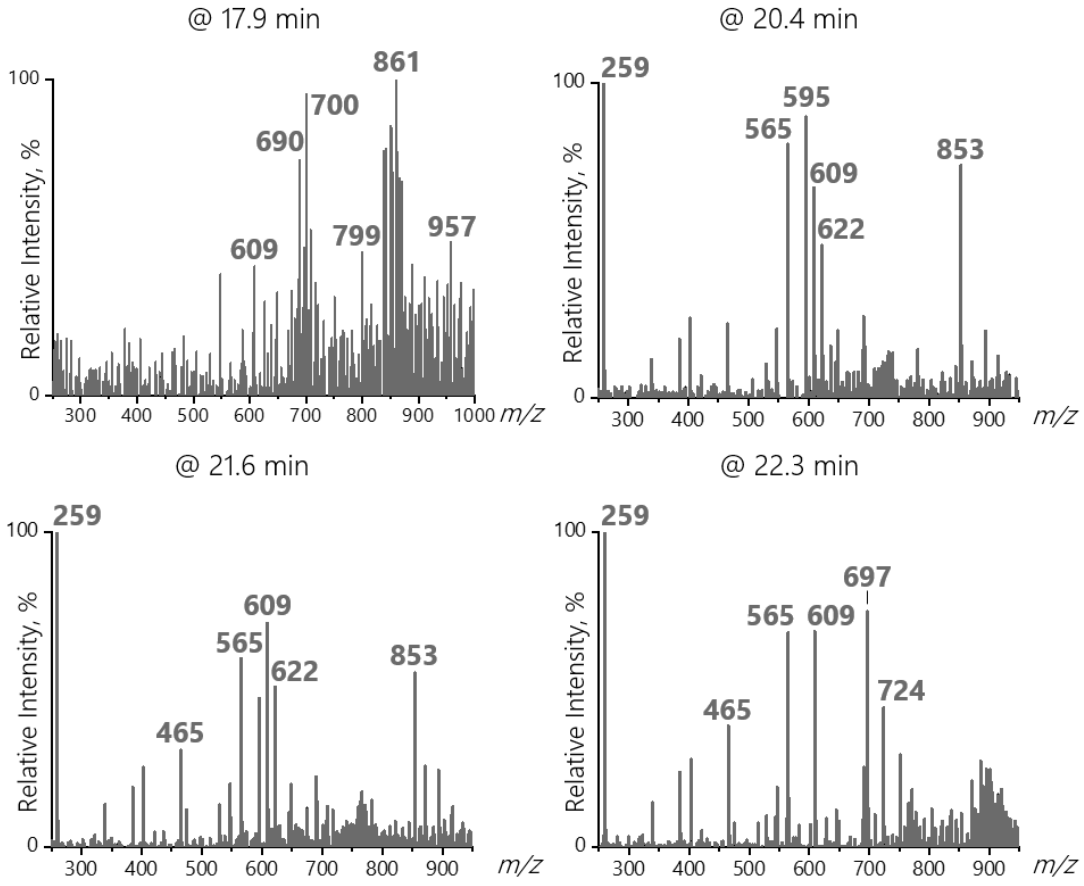

Fig. S5: Mass spectra of the oligosaccharides eluting between 17.9 min and 22.3 min, enzymatically released from LC2 after κ-carrageenase treatment. The analysis was conducted using HPLC-MS in negative full scan mode. The retention times of the oligosaccharides are indicated above the mass spectra.

Fig. S6: Mass spectra of the oligosaccharide eluting at 17.9 min, enzymatically released from LC1 after κ-carrageenase treatment. The analysis was conducted using HPLC-MS in negative full scan mode. The retention times of the oligosaccharides are indicated above the mass spectra.

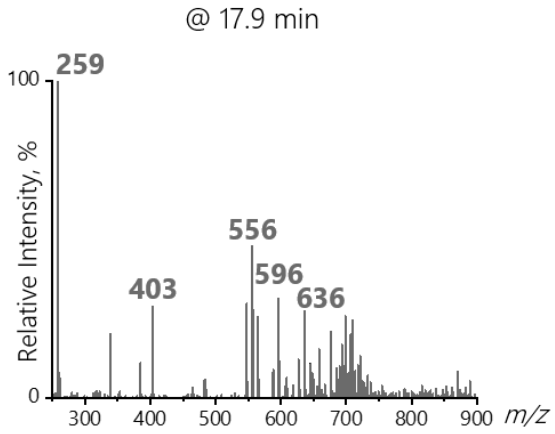

Fig. S7: Mass spectra of the oligosaccharide eluting at 17.9 min, enzymatically released from C1 after κ-carrageenase treatment. The analysis was conducted using HPLC-MS in negative full scan mode. The retention times of the oligosaccharides are indicated above the mass spectra.

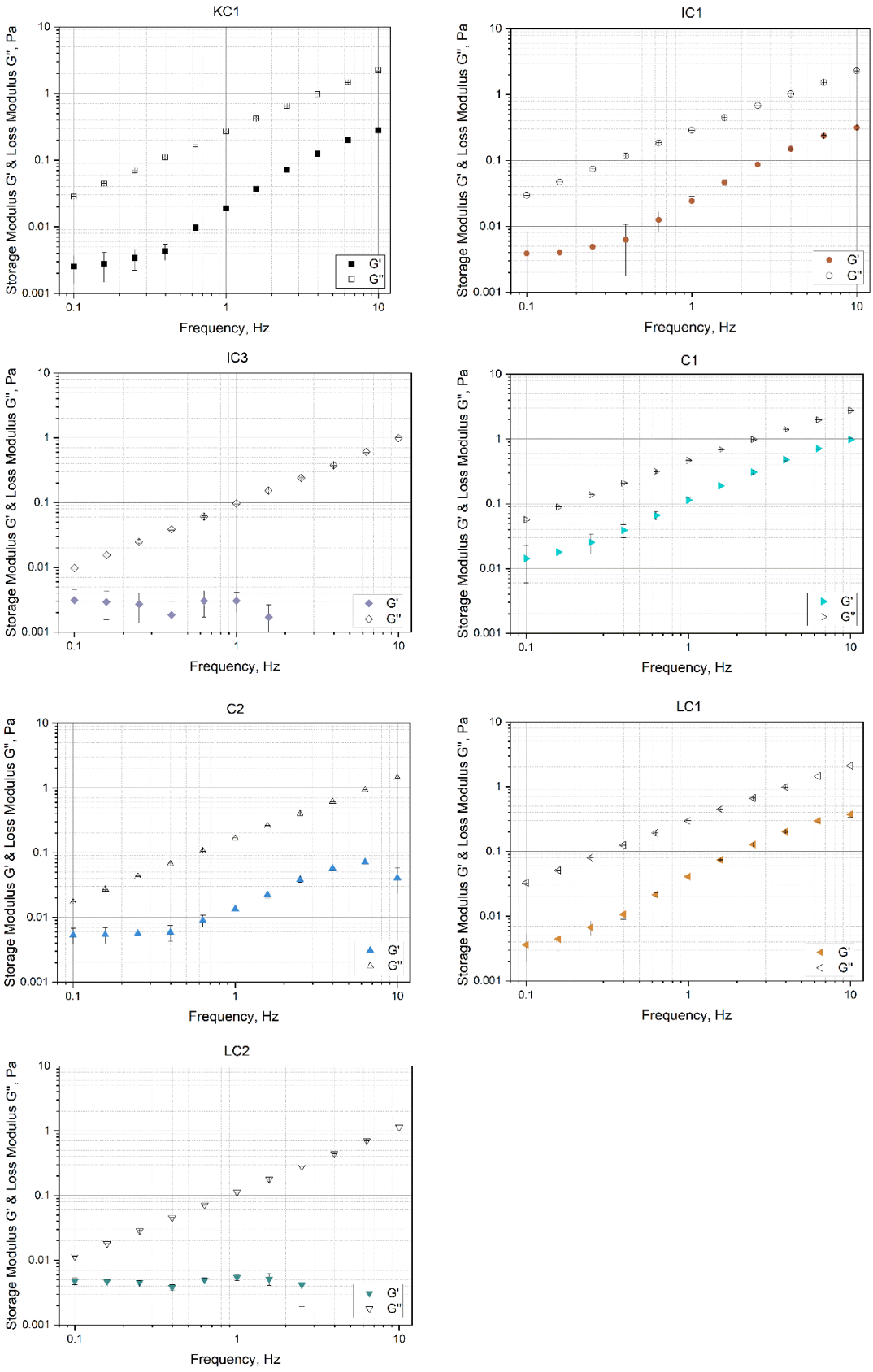

Fig. S8: Storage Modulus G’ and loss modulus G’’ of the seven rheologically analyzed commercial carrageenan samples. The filled symbols correspond to the storage modulus G’, while the empty symbols represent the loss modulus G’’. The samples were prepared without $CaCl_2$ addition and exhibit a predominantly viscous behavior.

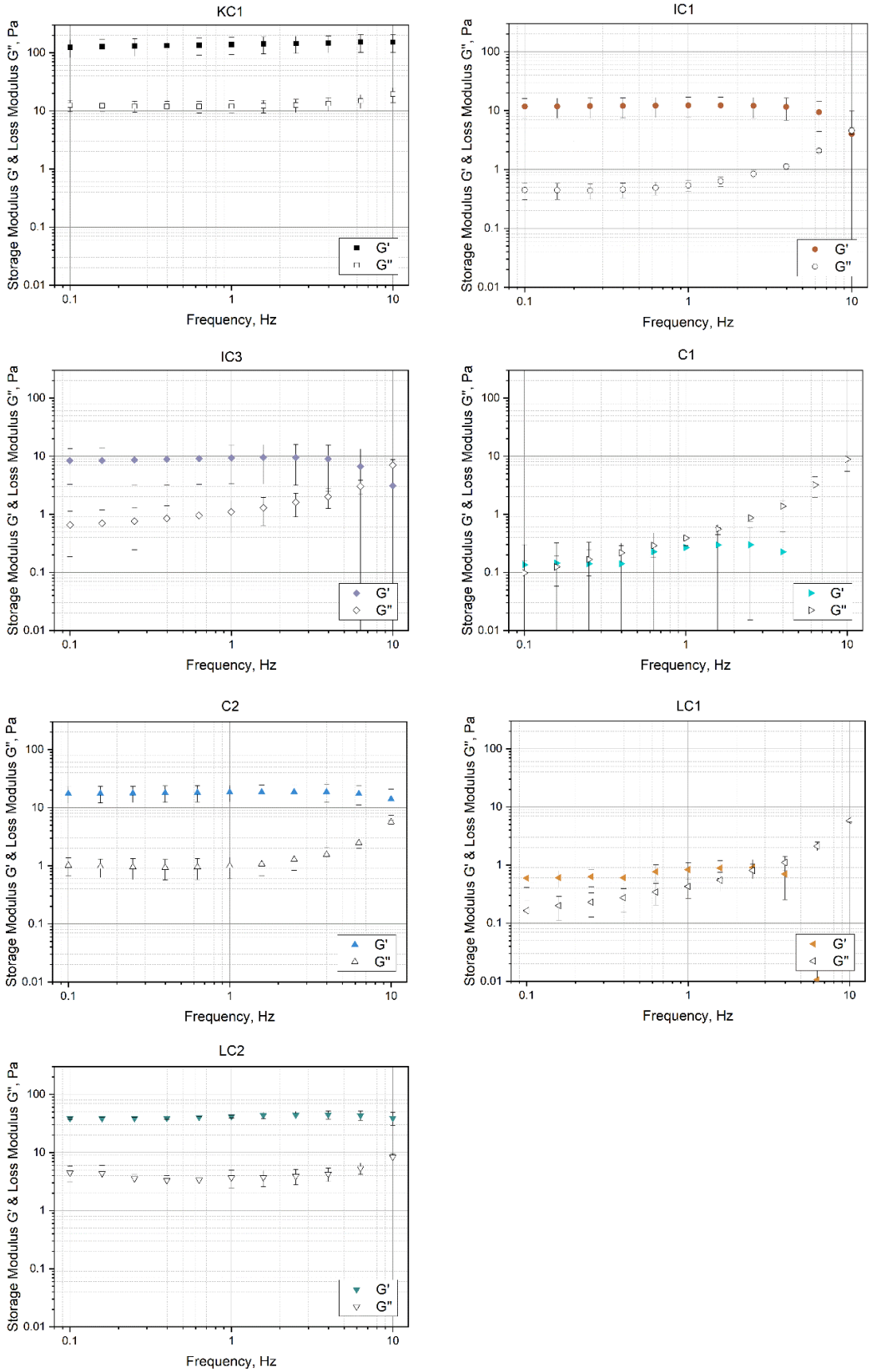

Fig. S9: Storage Modulus G' and loss modulus G'' of the seven commercially available carrageenan samples analyzed rheologically with the addition of $CaCl_2$. The filled symbols correspond to the storage modulus G', while the empty symbols represent the loss modulus G''. With exception of samples C1 and LC1, all other measured samples exhibit gel formation, although the gel strengths vary.

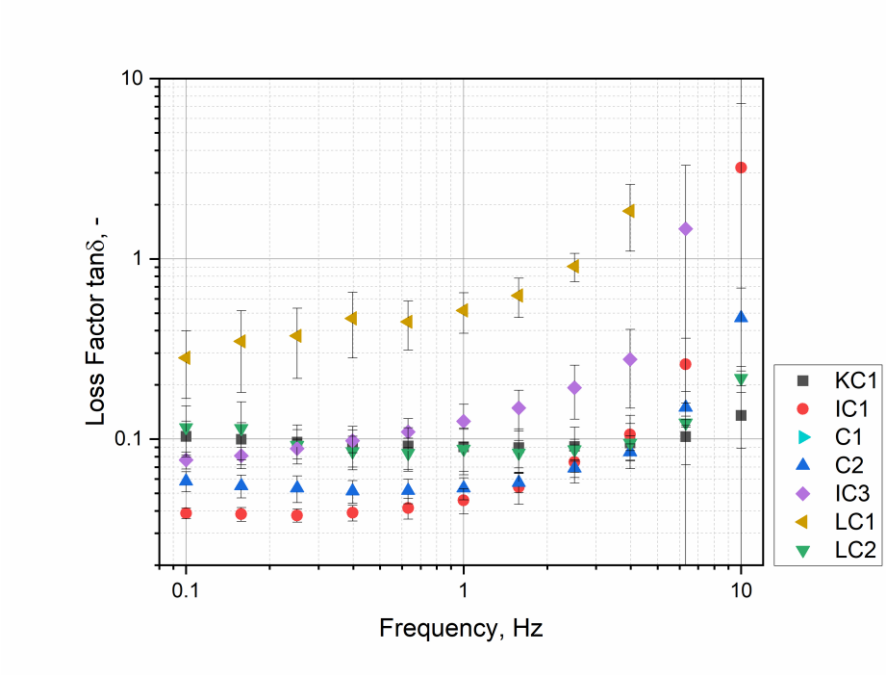

Fig. S10: Loss factors of the different commercial carrageenan samples in 0.1 M $CaCl_2$ solution measured at a frequency range between 0.1 and 10 Hz at an amplitude γ of 2 %.