Appendix C: Experimental Figures

C1 FFT Sample Data

The following figures are plots derived for a Taylor G1 05 untreated, power mean averaged sample.

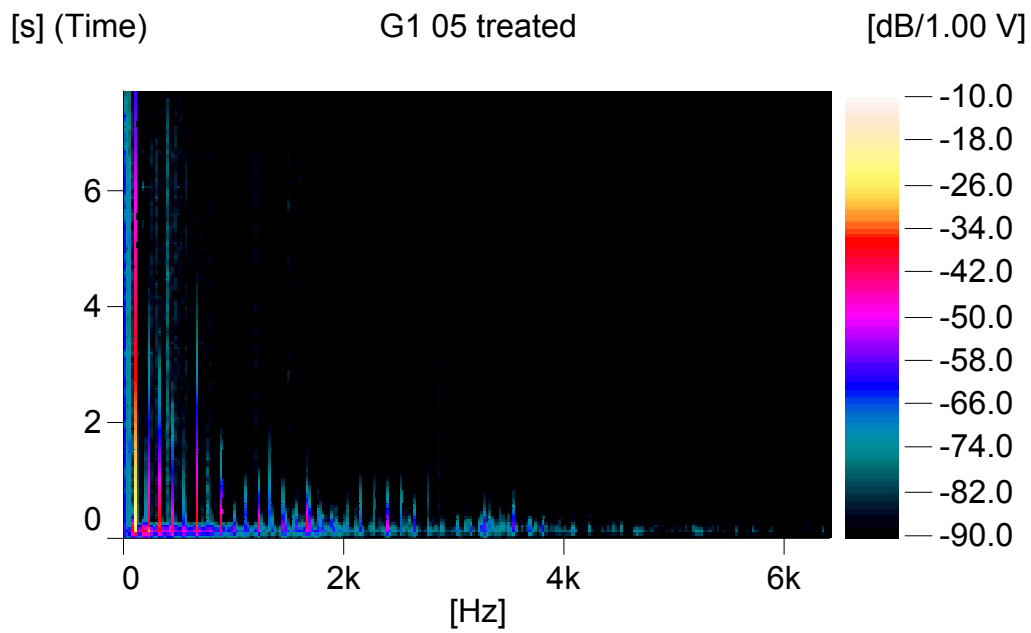

Figure C1-1 Colour Contour plot of FFT time-spectra as generated by PULSE platform.

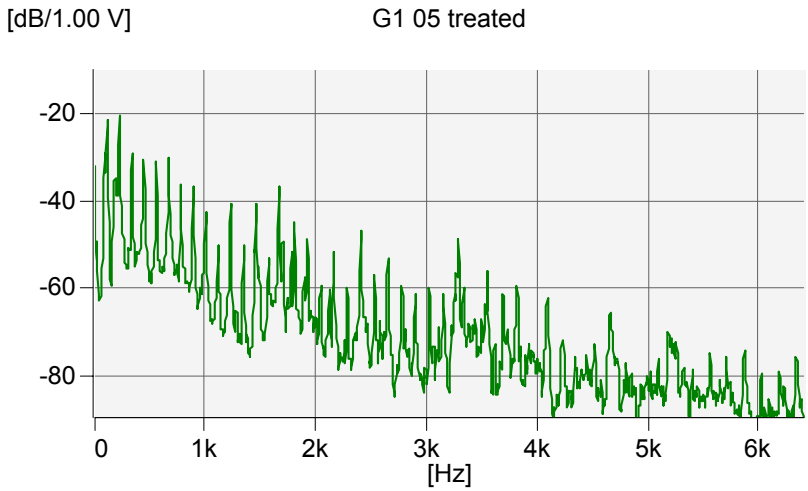

Figure C1-2 Corresponding peak plots extracted from Peak Averaging function. Note the regularly spaced harmonic spikes.

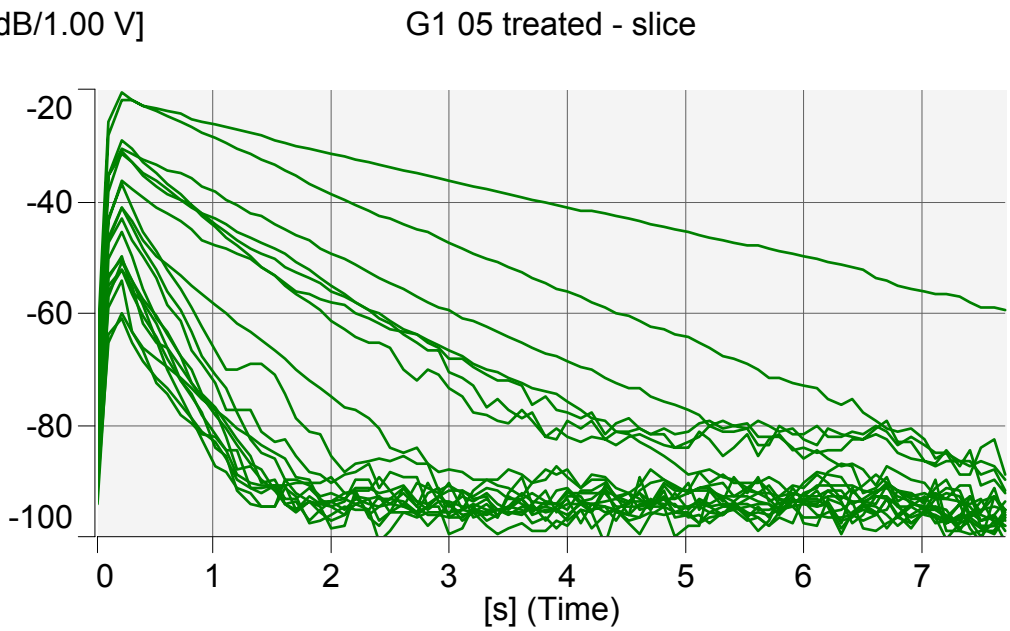

Figure C1-3 Corresponding frequency slices of Figure C1-1, taken at partial frequencies, constitute the Harmonic Decay plot for the first 20 partials. Note the fairly straight decay lines of varying rates. –90dB/1.00V is the background noise level (signal reference level).

C2 Power Mean Example

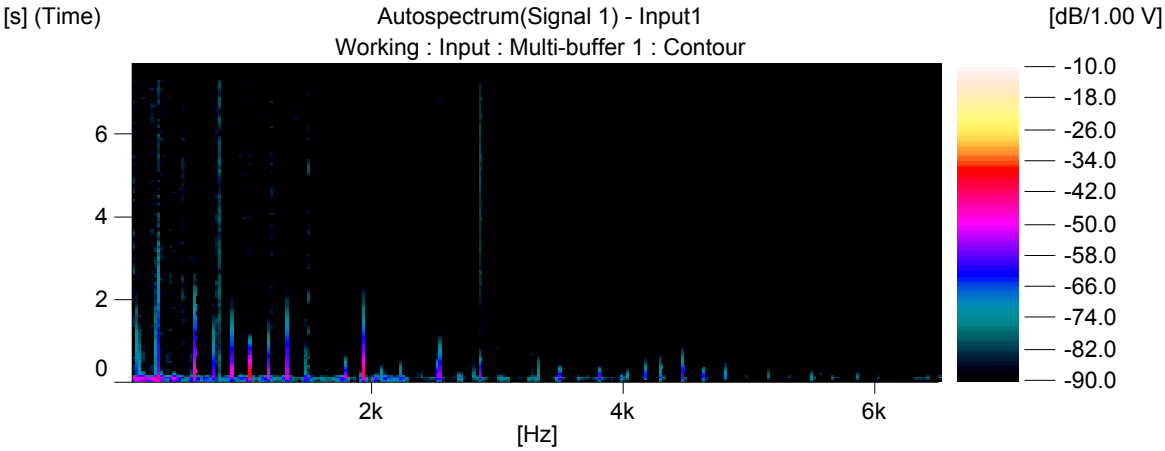

Figure C2-1 **Sample 1** (Input1) time spectra contour plot, Taylor G2 05 Untreated, String 1

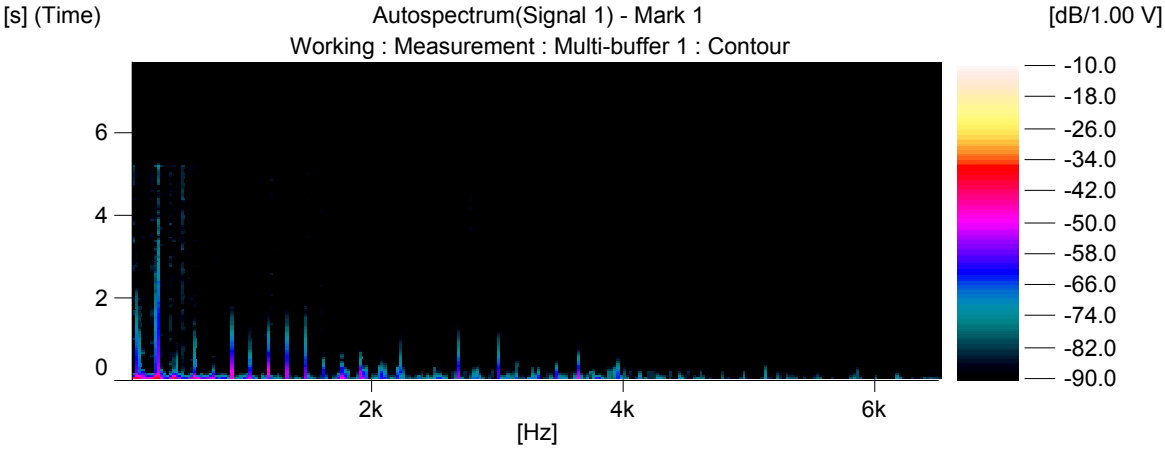

Figure C2-2 **Sample 2** (Mark 1) time spectra contour plot, Taylor G2 05 Untreated, String 1

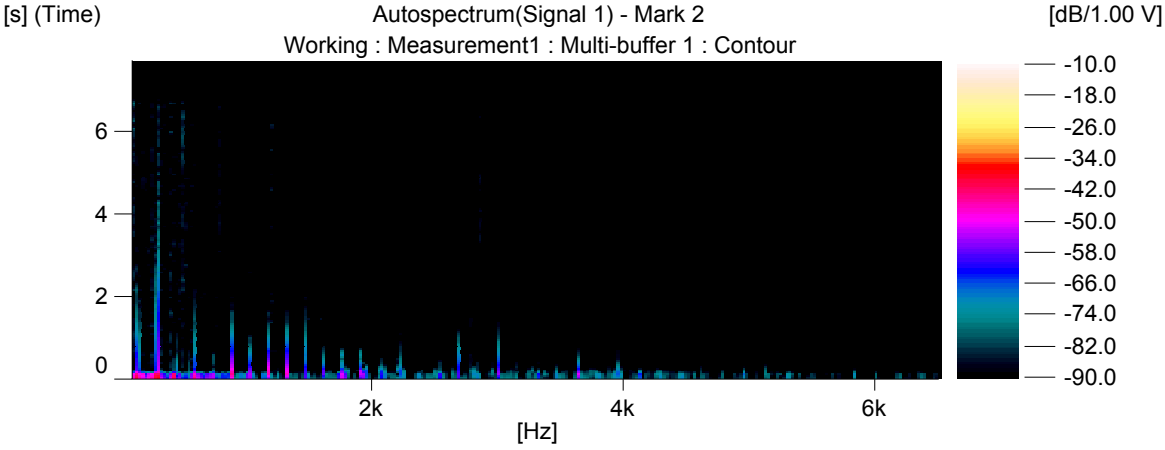

Figure C2-3 **Sample 3** (Mark 2) time spectra contour plot, Taylor G2 05 Untreated, String 2

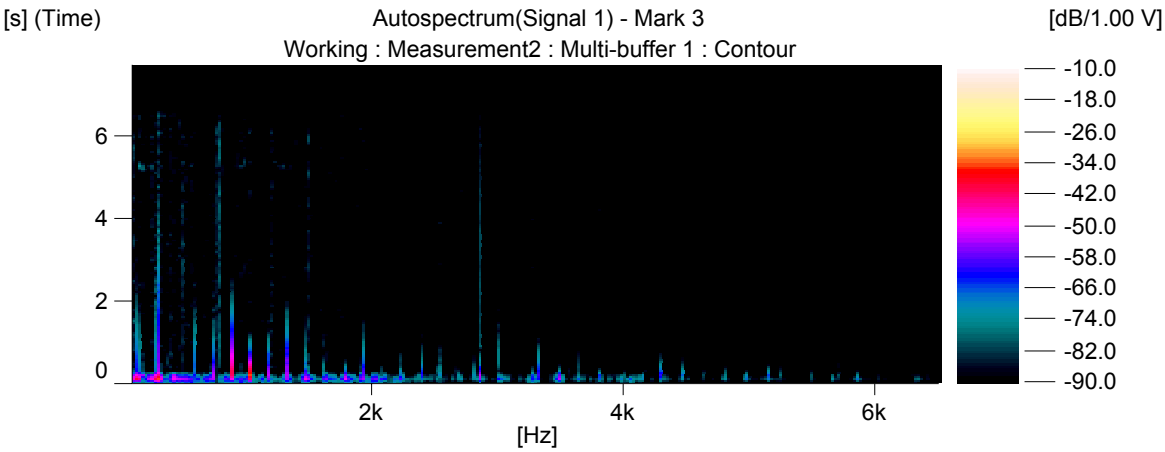

Figure C2-4 **Sample 4** (Mark 3) time spectra contour plot, Taylor G2 05 Untreated, String 2

Power Mean of Input

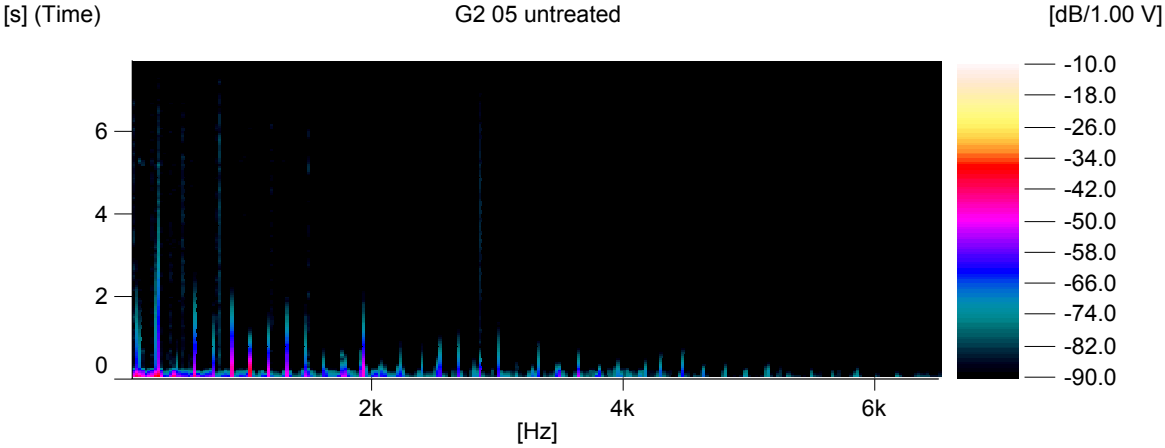

Figure C2-5 **Power Mean** (composed of Input 1 + Mark 1 + Mark 2 + Mark 3), time spectra contour plot, Taylor G2 05 Untreated

C3 Colour Contour FFT Time-Plots for Monochord Test

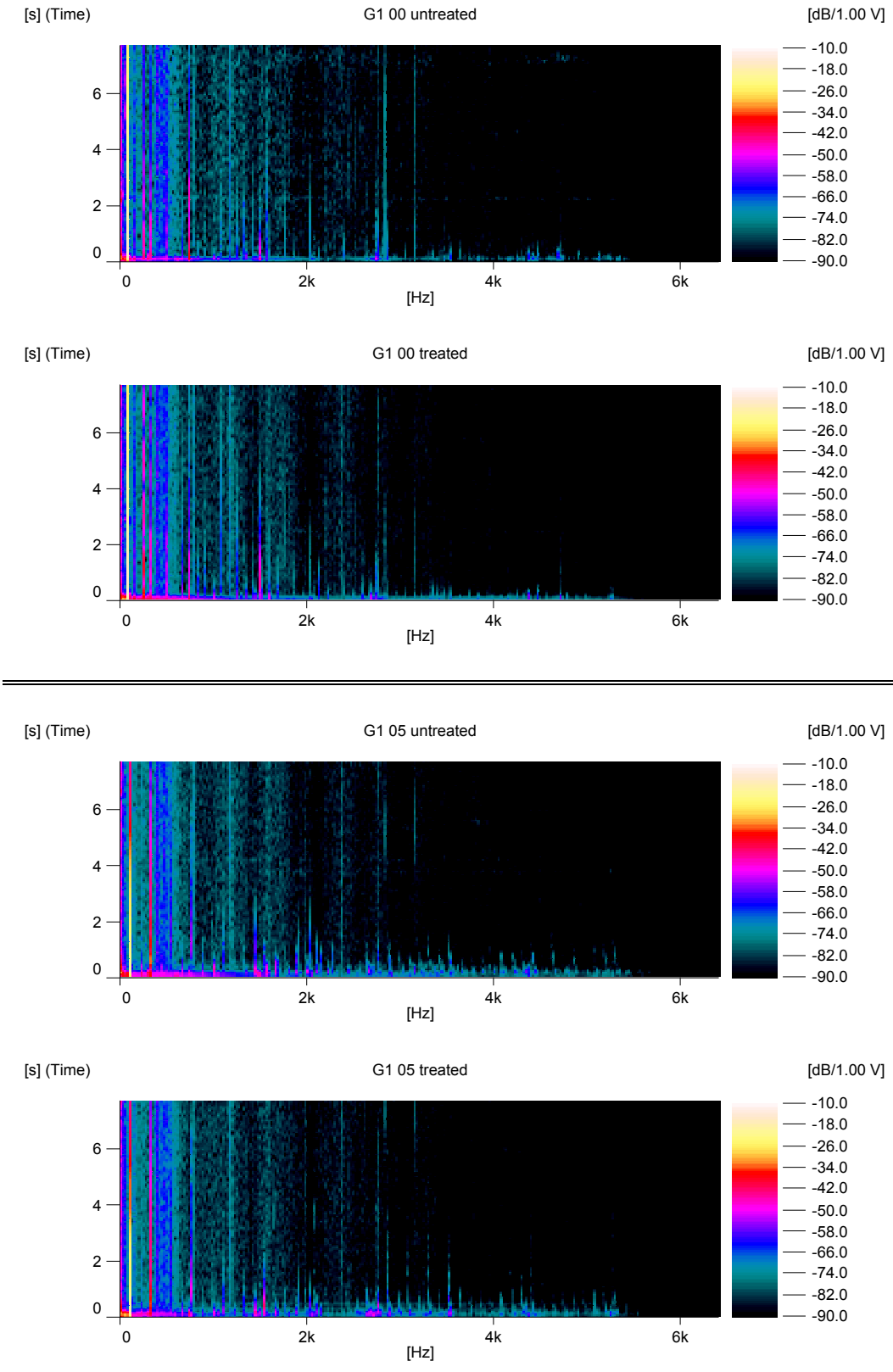

Figure C3-1 Monochord G1 00 and G1 05, treated and untreated

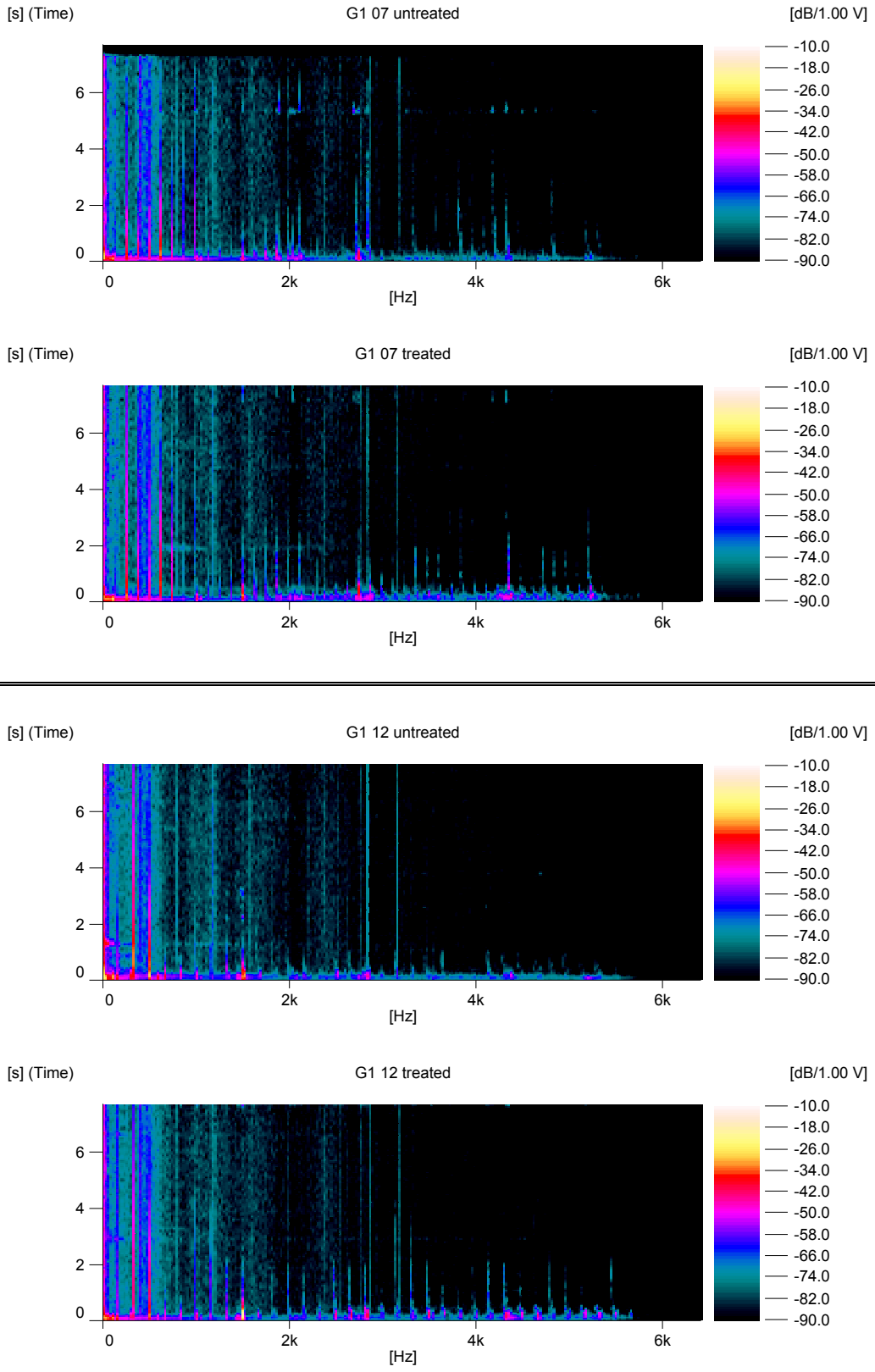

Figure C3-2 Monochord G1 07 and G1 12, treated and untreated

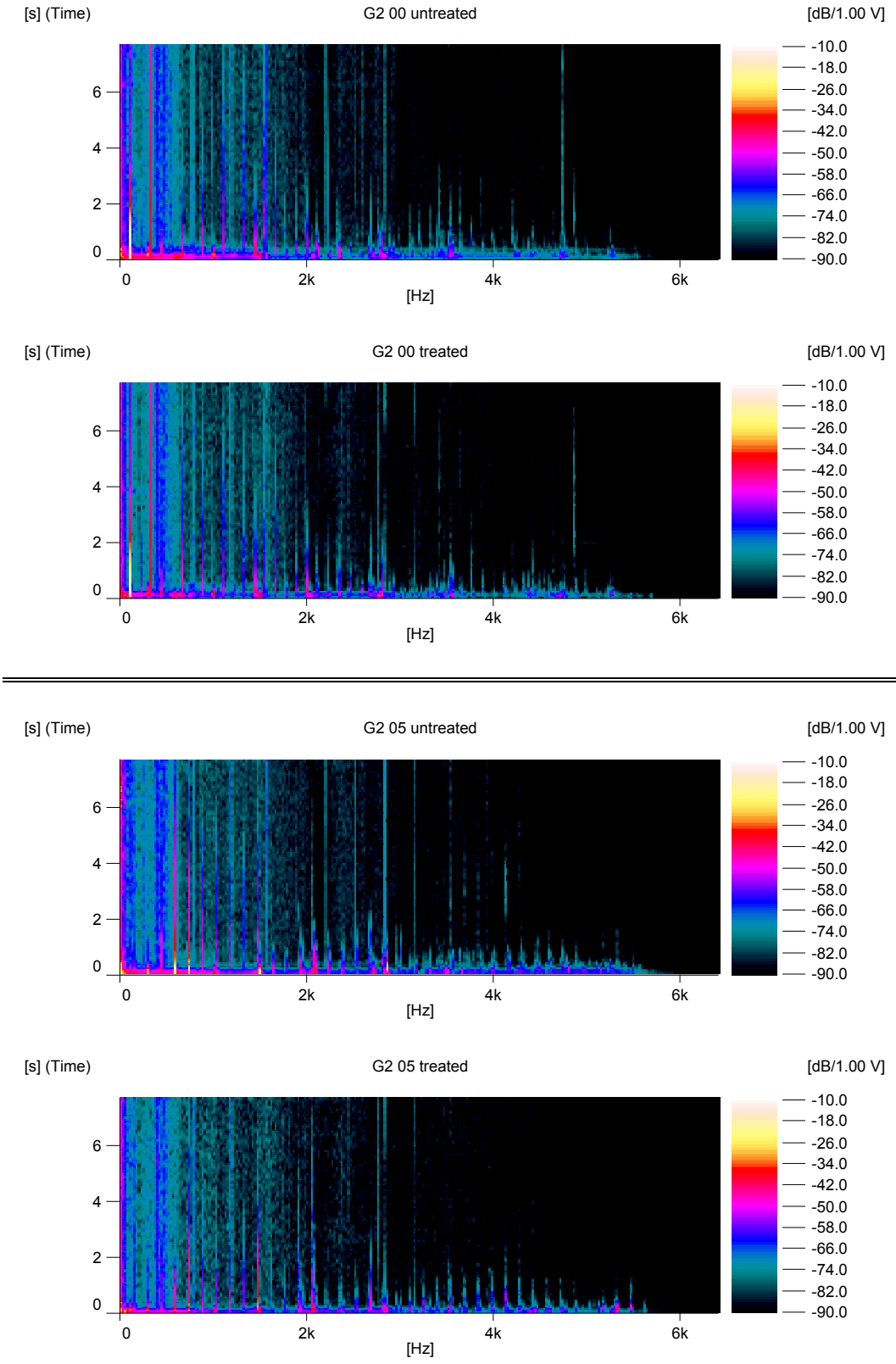

Figure C3-3 Monochord G2 00 and G2 05, treated and untreated

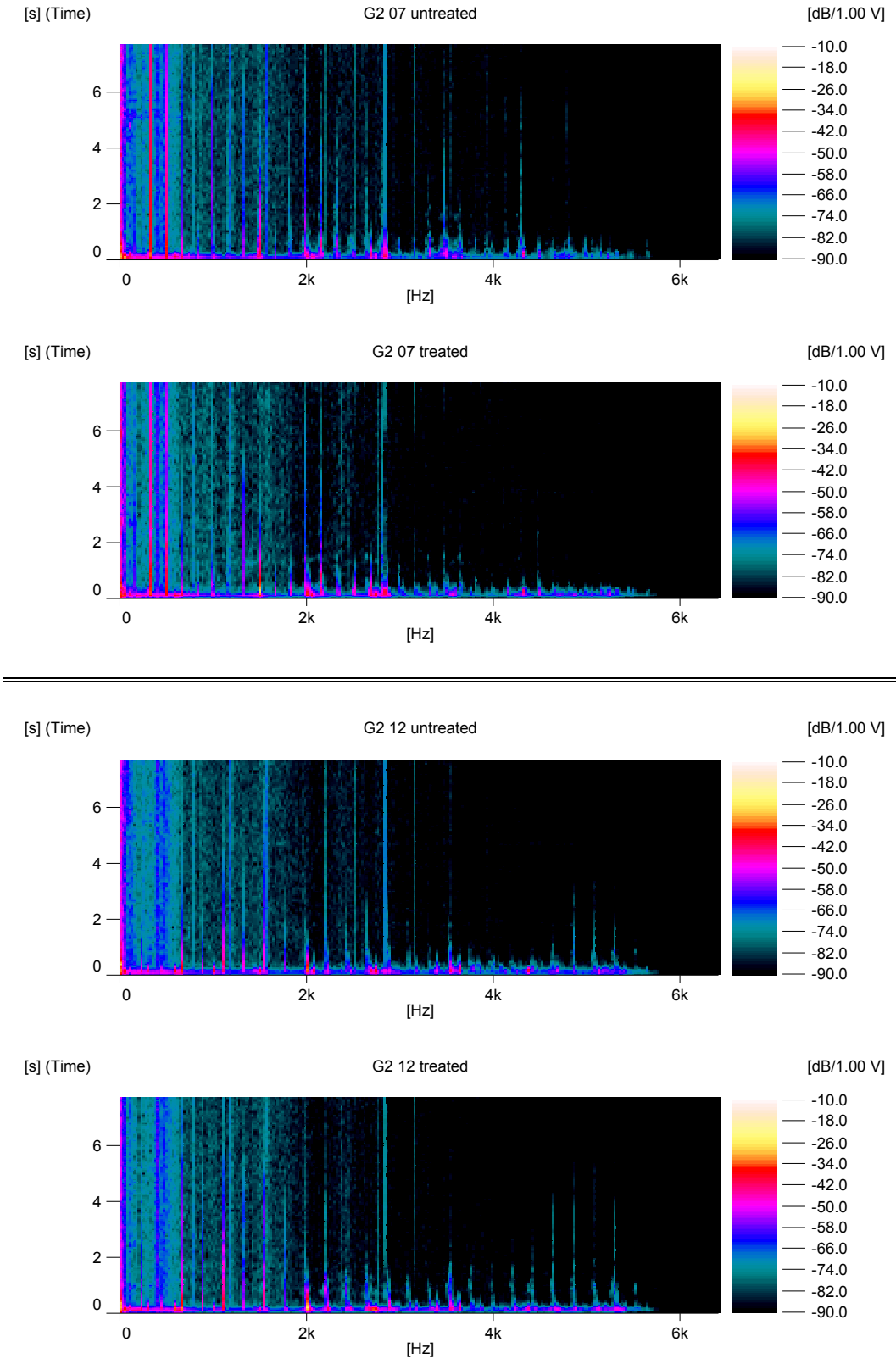

Figure C3-4 Monochord G2 07 and G2 12, treated and untreated

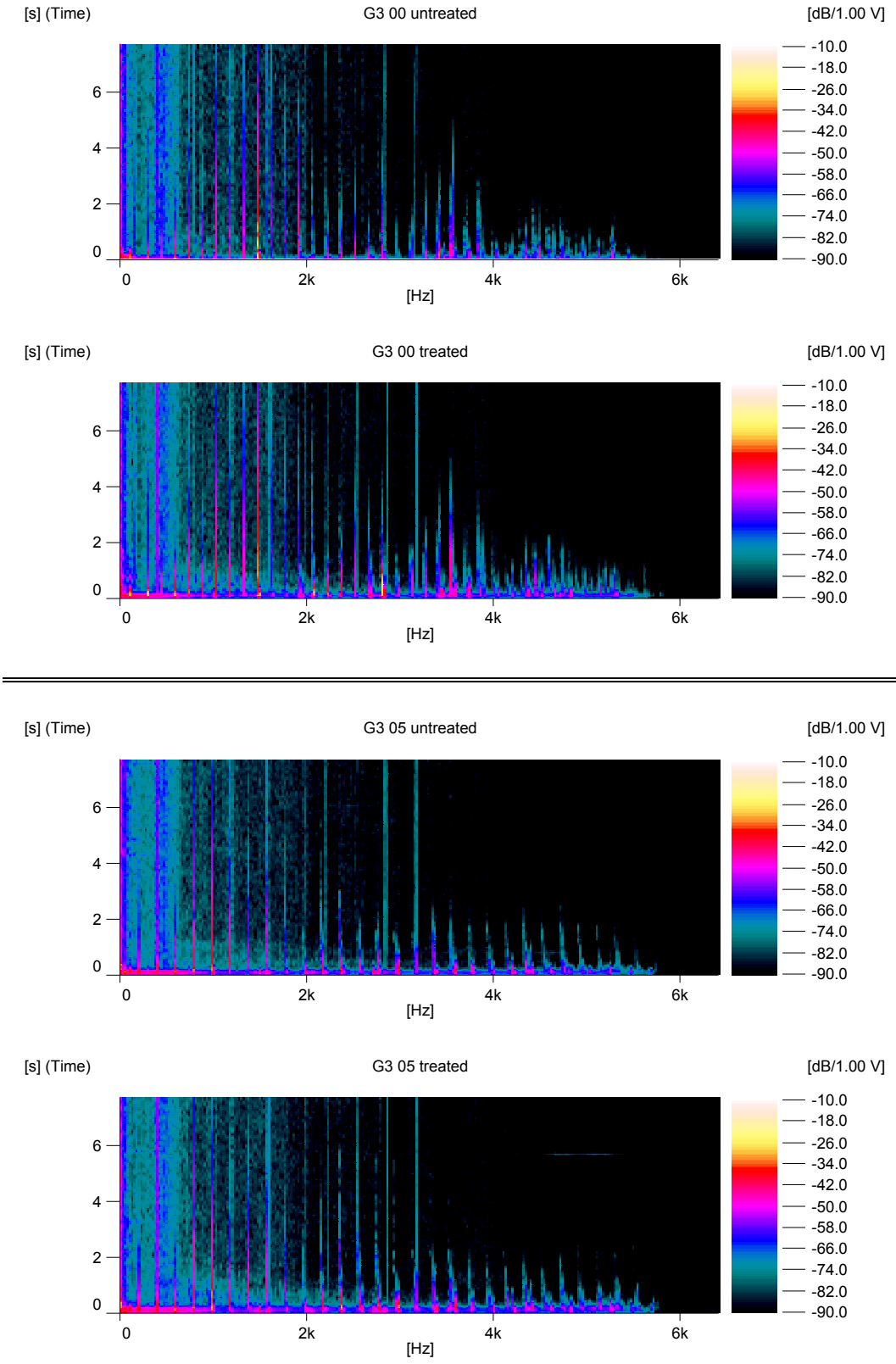

Figure C3-5 Monochord G3 00 and G3 05, treated and untreated

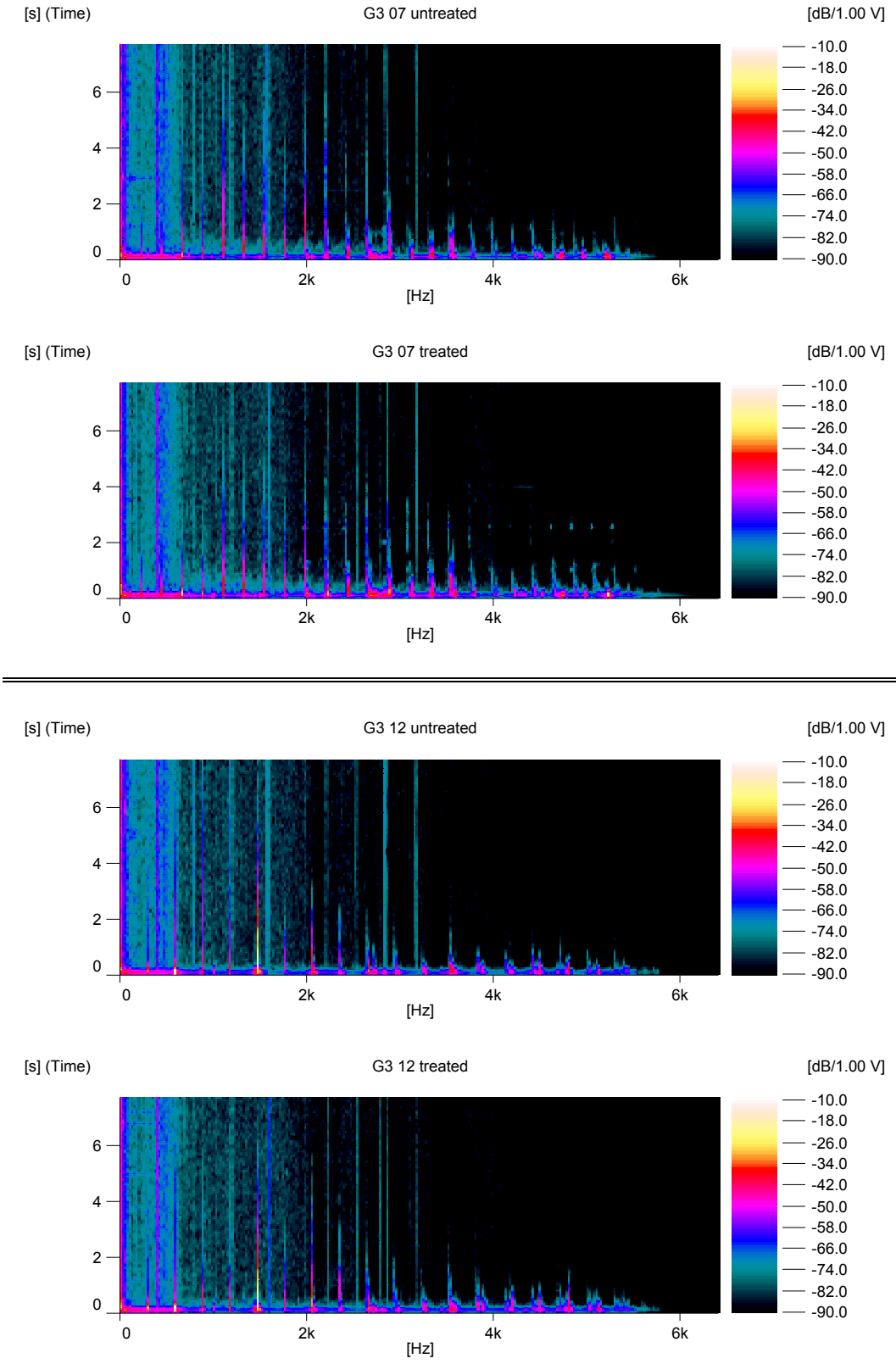

Figure C3-6 Monochord G3 07 and G3 12, treated and untreated

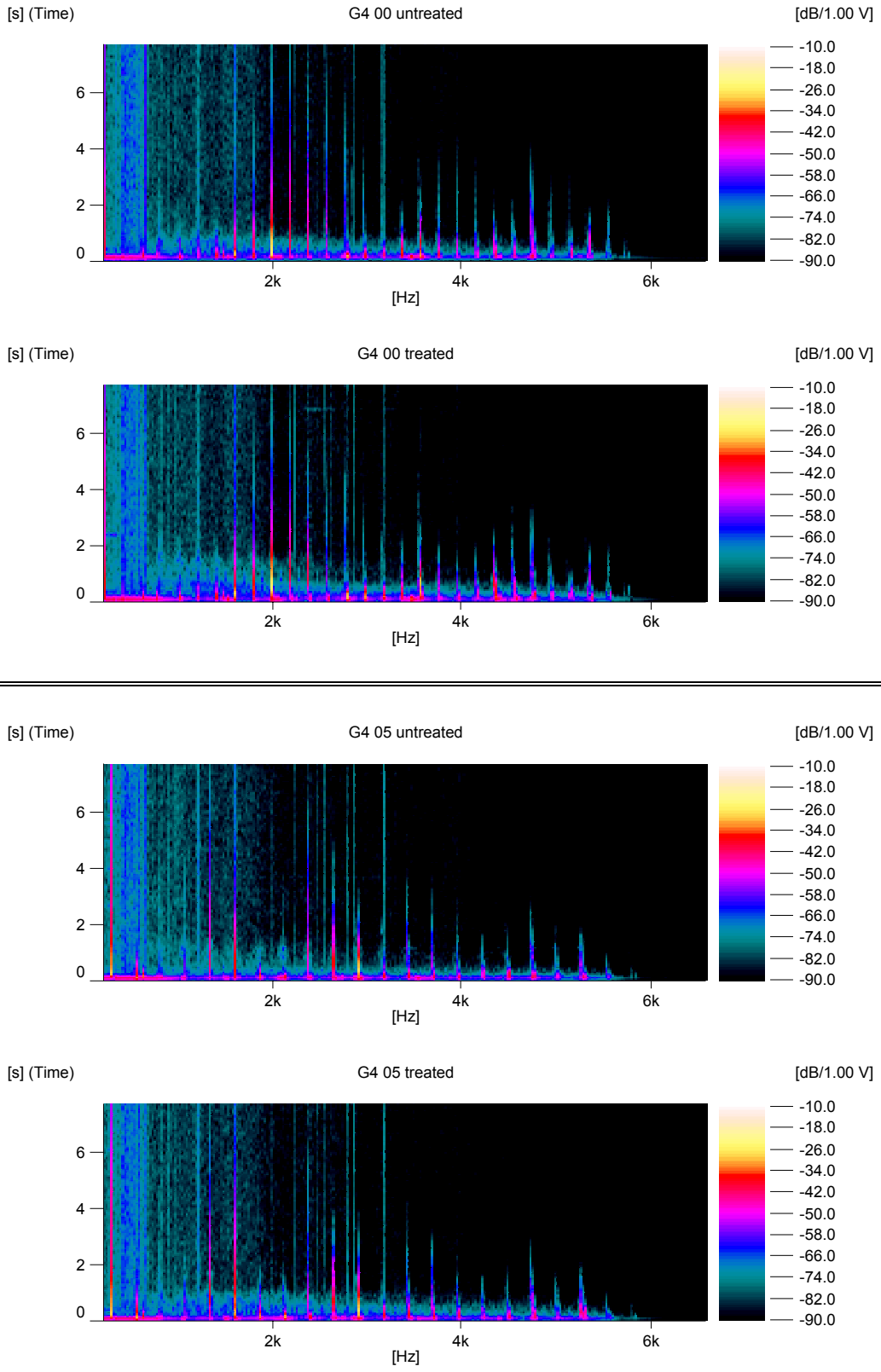

Figure C3-7 Monochord G4 00 and G4 05, treated and untreated

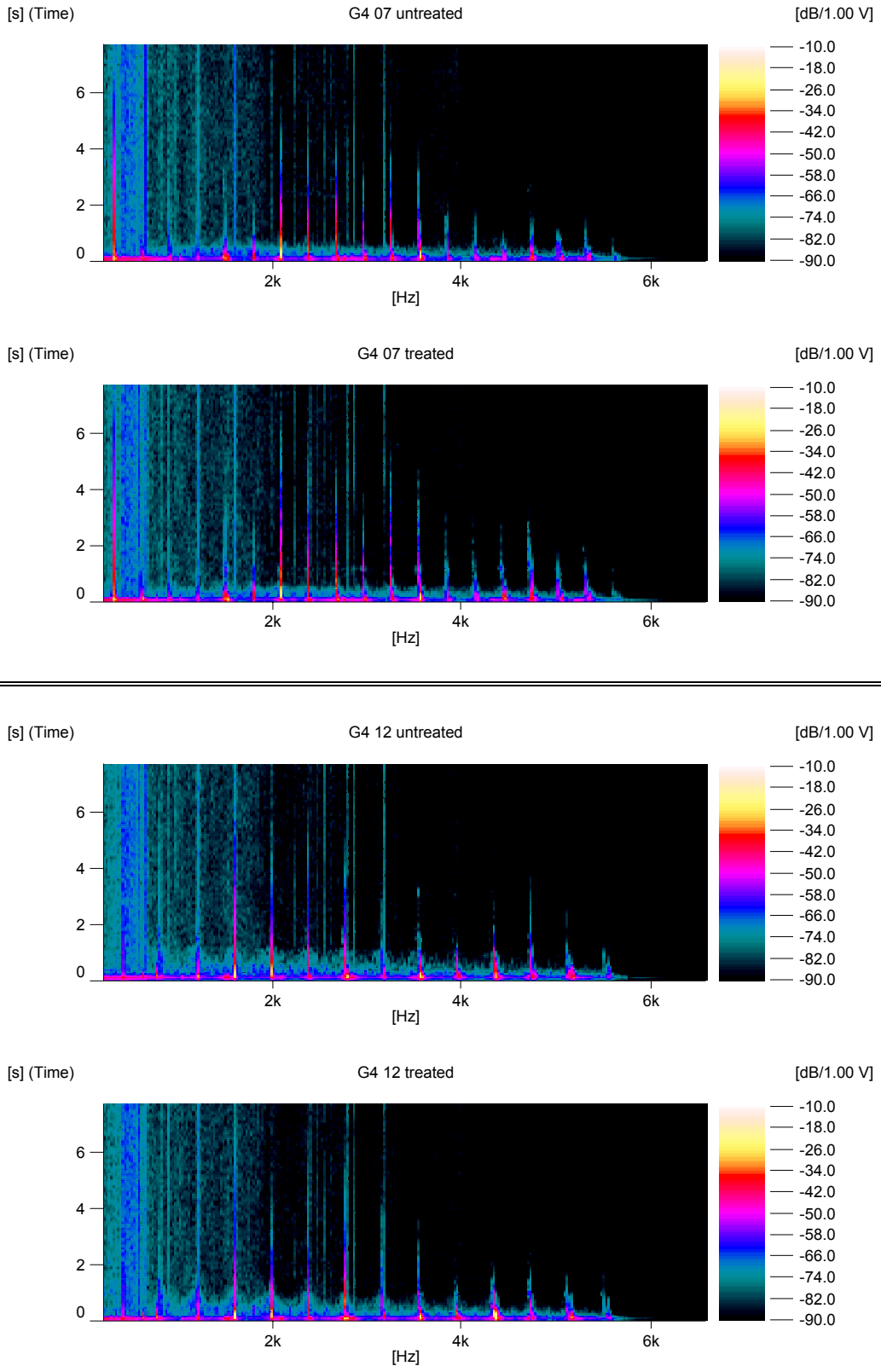

Figure C3-8 Monochord G4 07 and G4 12, treated and untreated

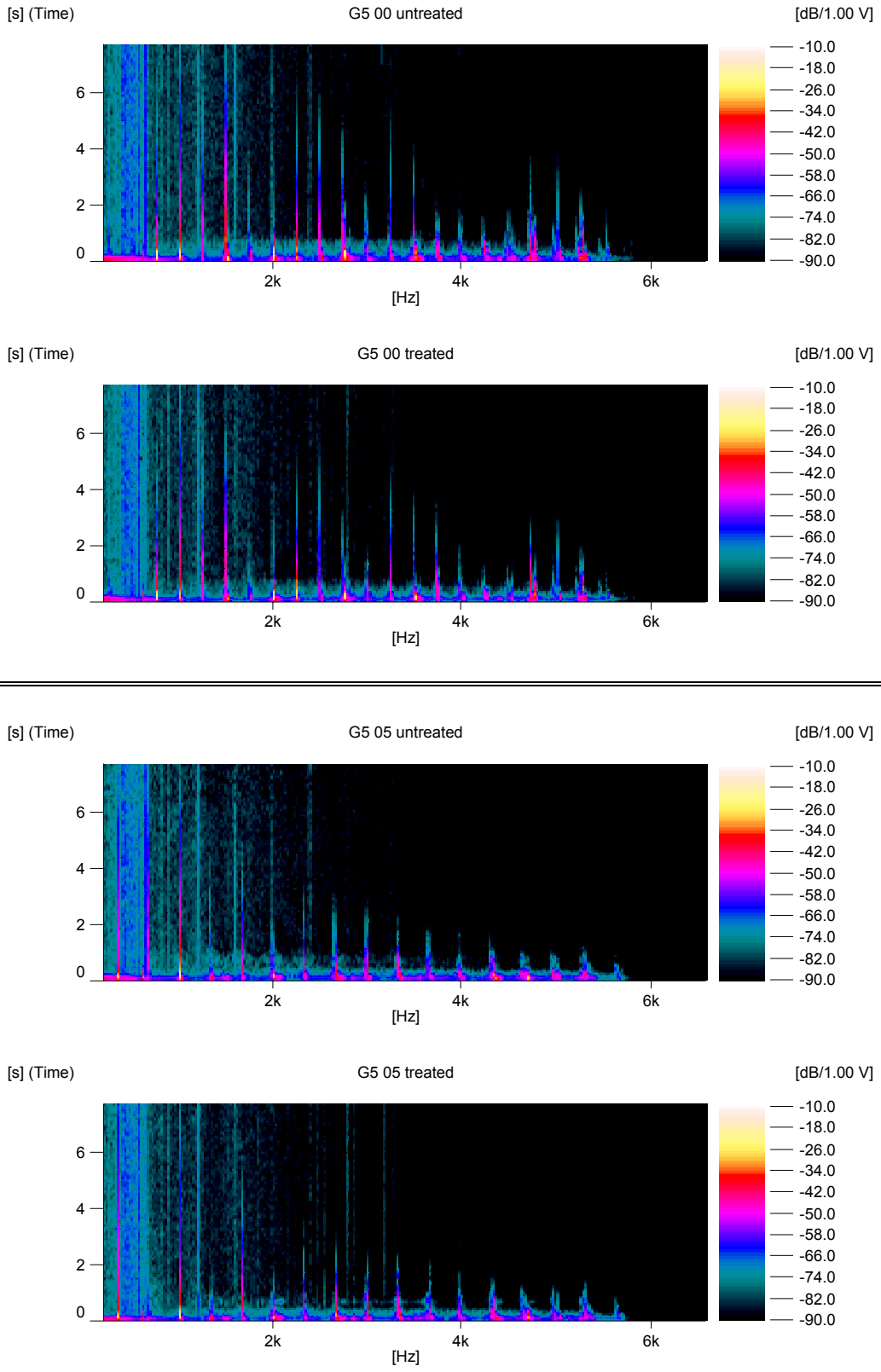

Figure C3-9 Monochord G5 00 and G5 05, treated and untreated

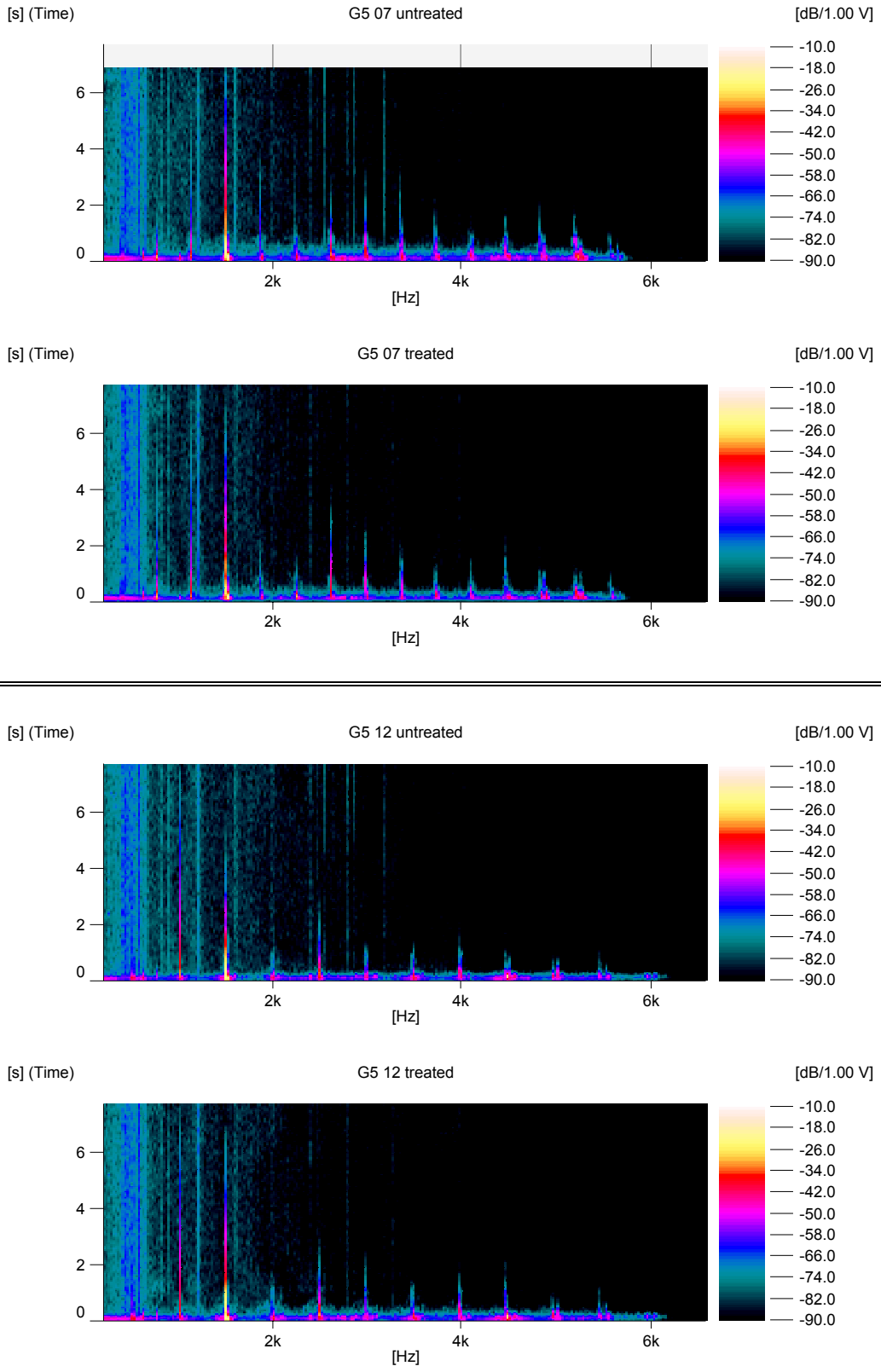

Figure C3-10 Monochord G5 07 and G5 12, treated and untreated

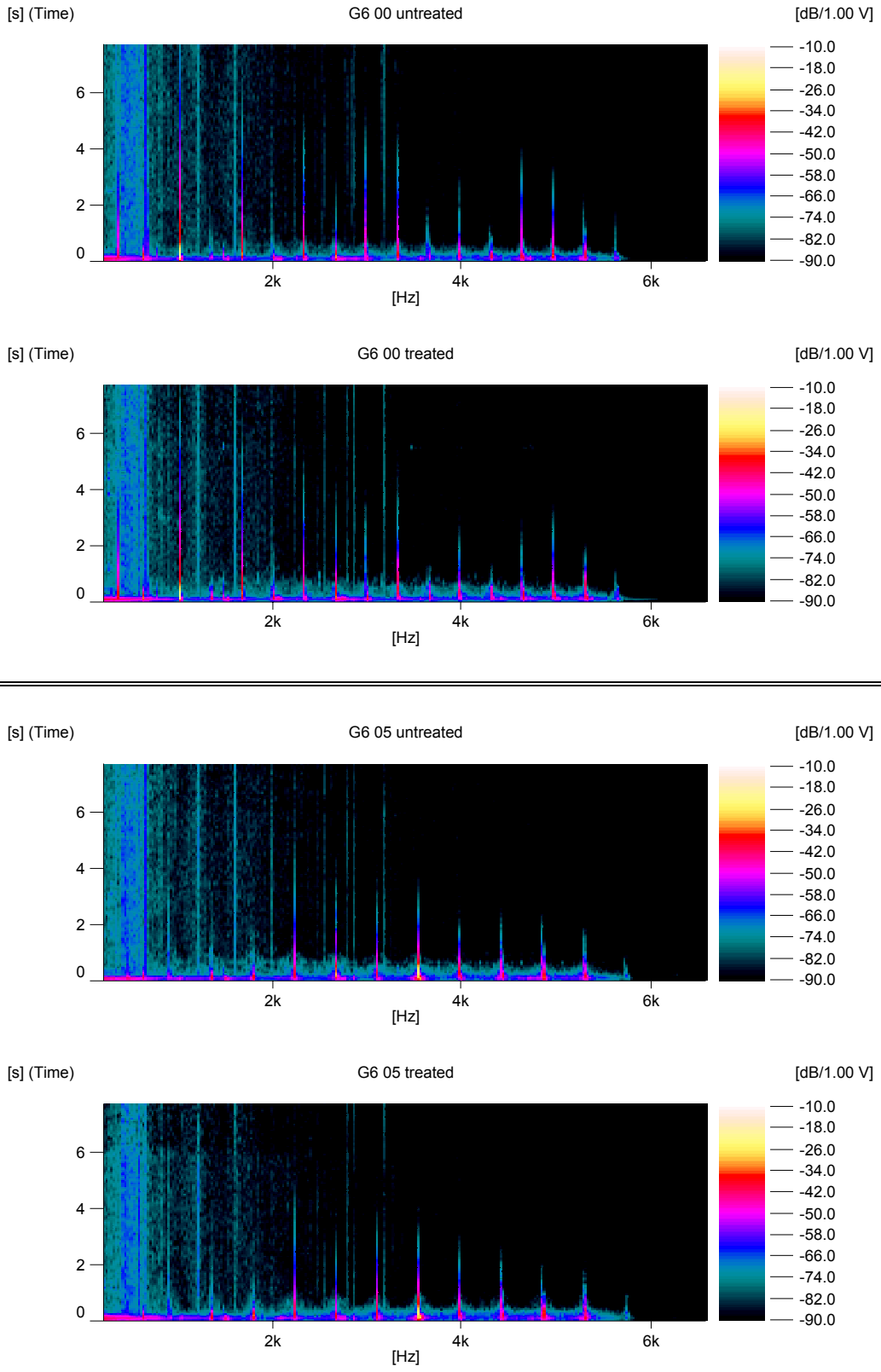

Figure C3-11 Monochord G6 00 and G6 05, treated and untreated

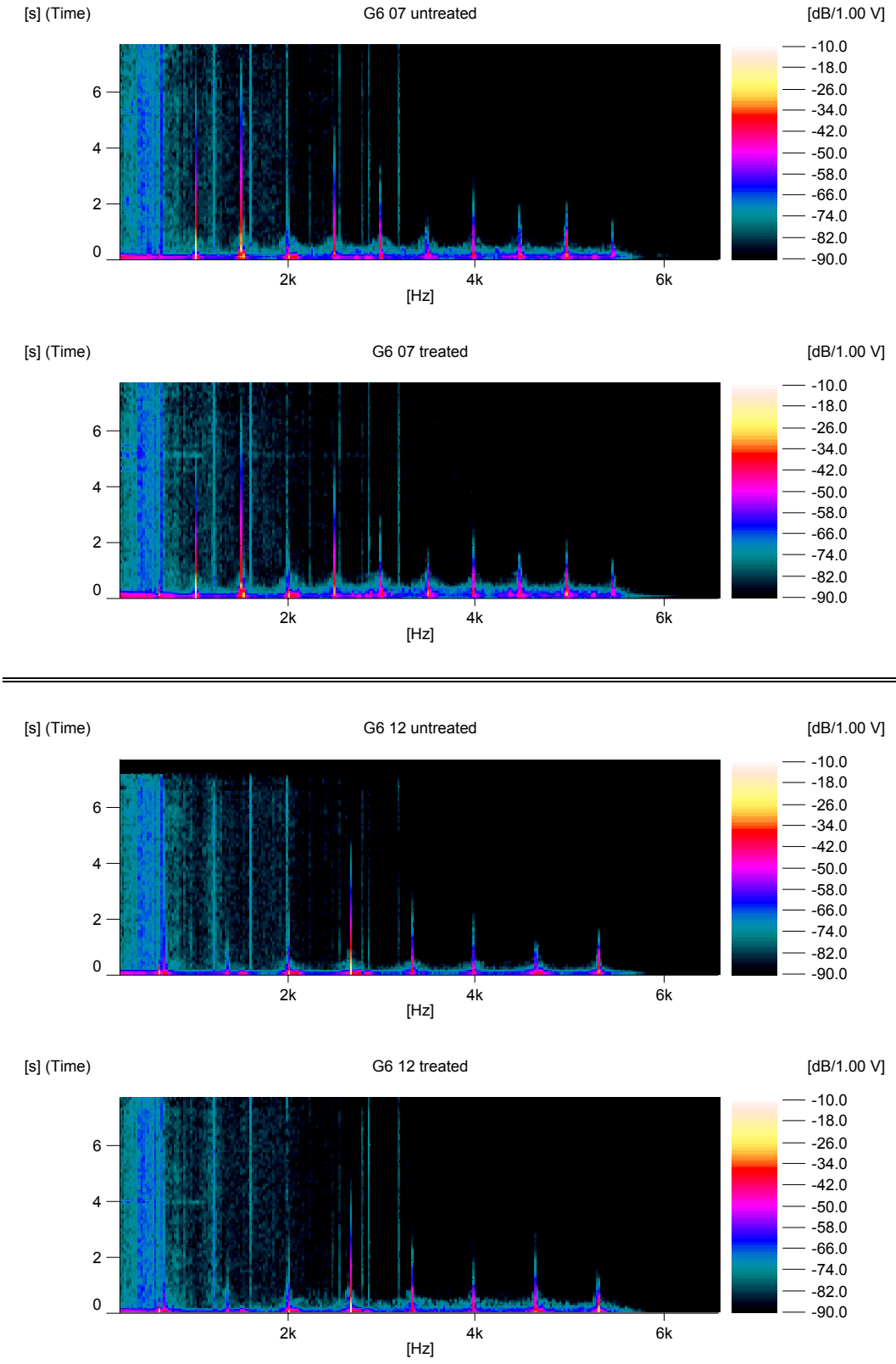

Figure C3-12 Monochord G6 07 and G6 12, treated and untreated

C4 Colour Contour FFT Time-Plots for Soundbox Test

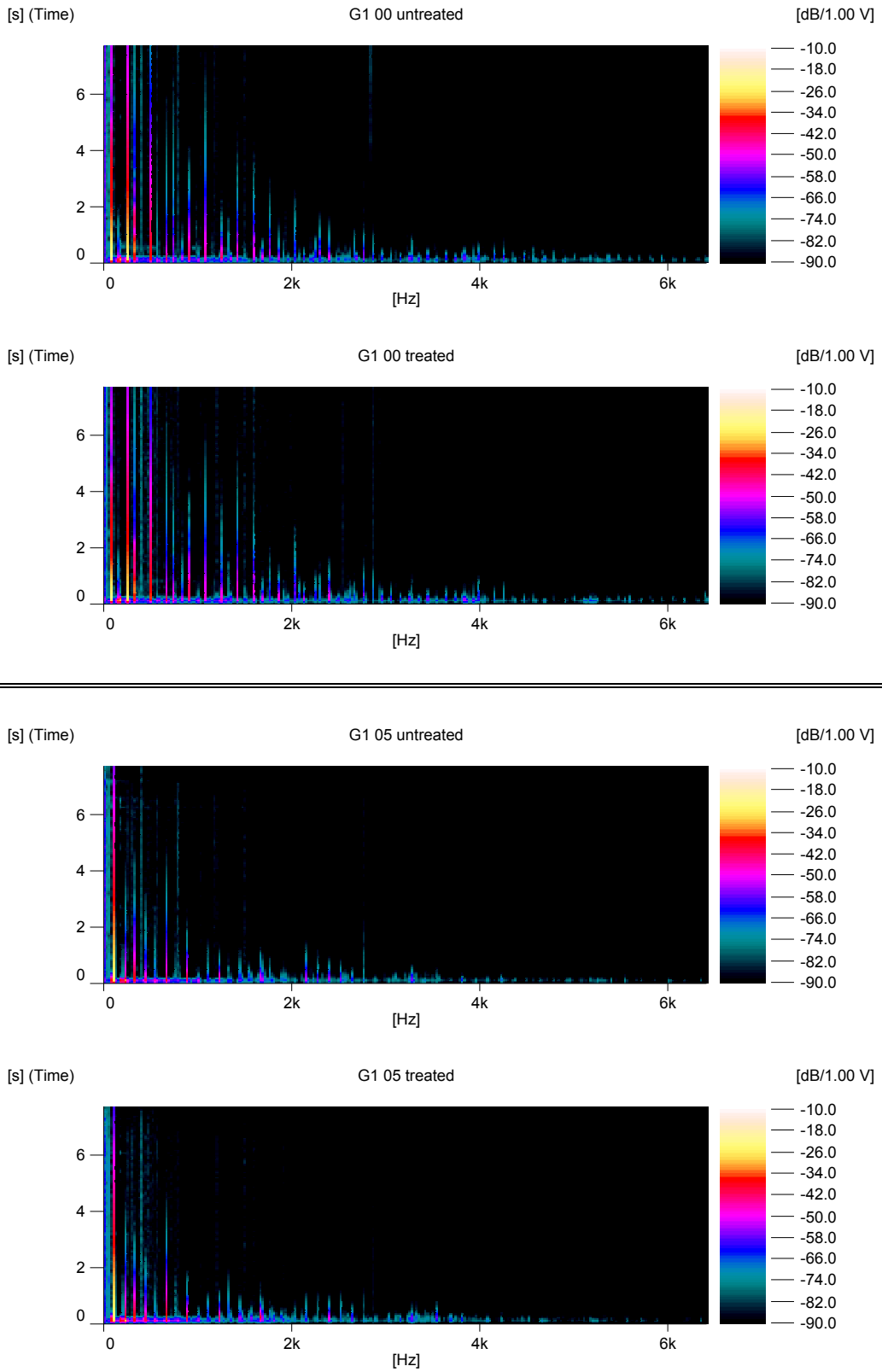

Figure C4-1 Taylor G1 00 and G1 05, treated and untreated

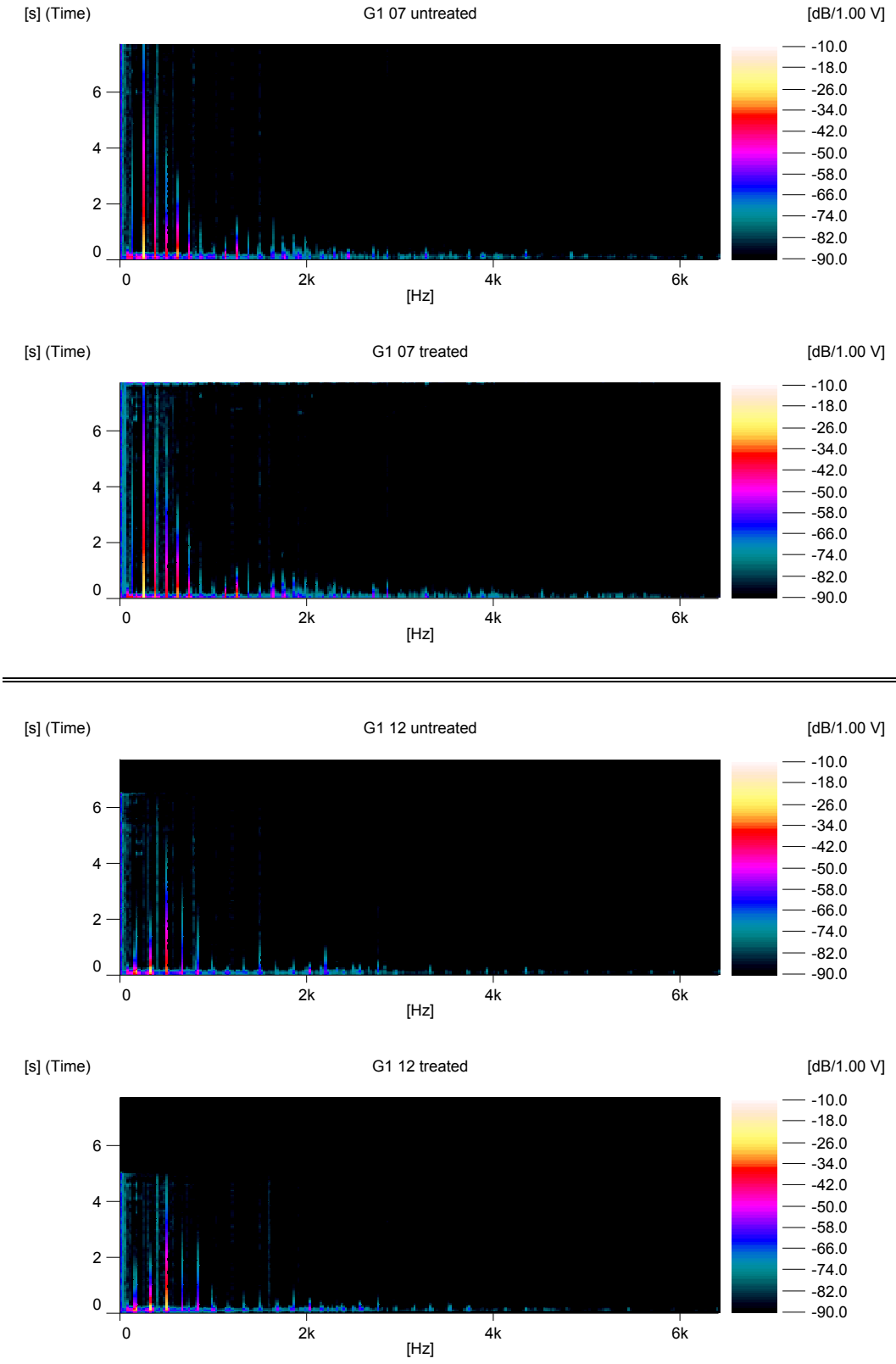

Figure C4-2 Taylor G1 07 and G1 12, treated and untreated

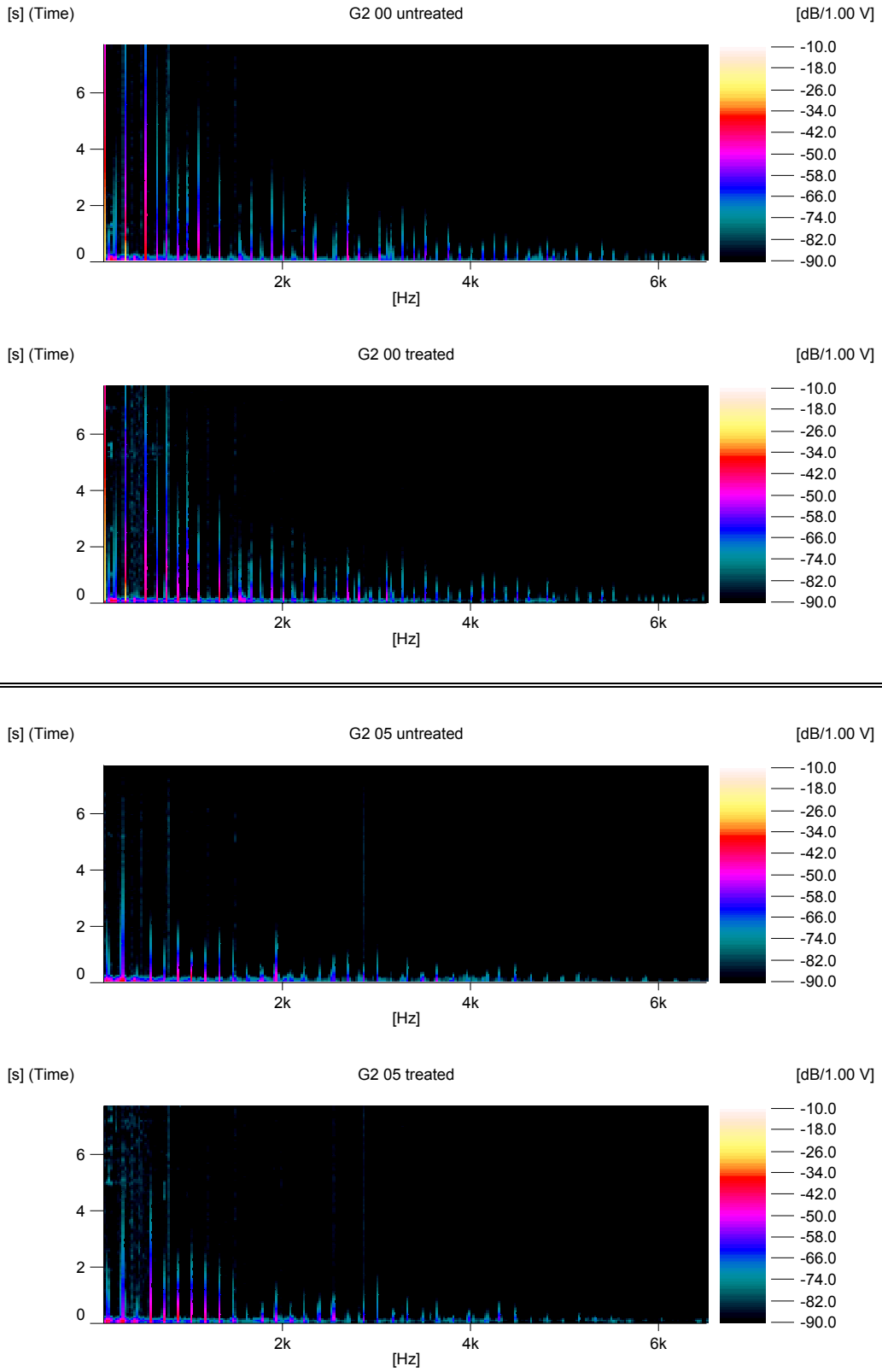

Figure C4-3 Taylor G2 00 and G2 05, treated and untreated

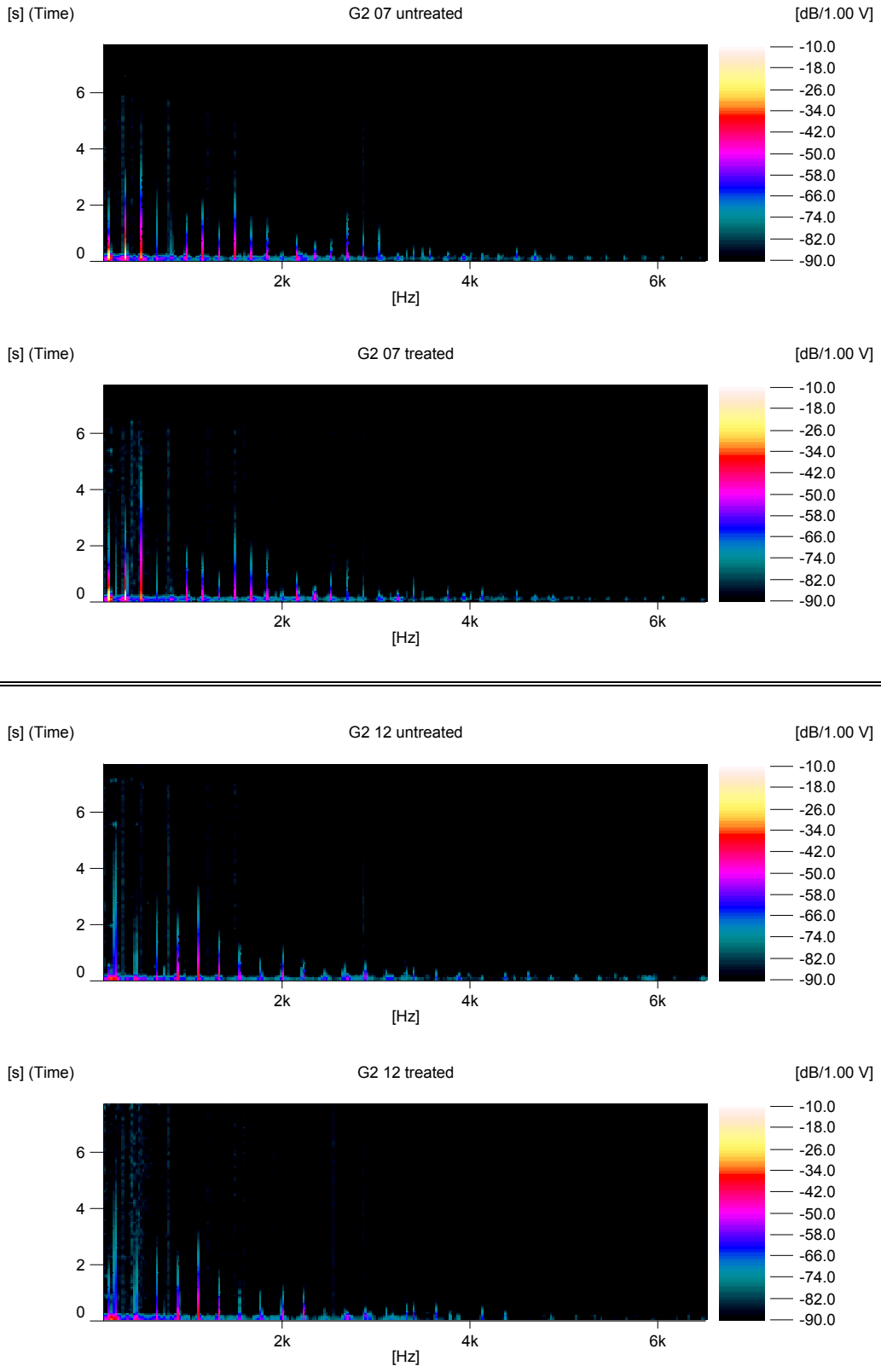

Figure C4-4 Taylor G2 07 and G2 12, treated and untreated

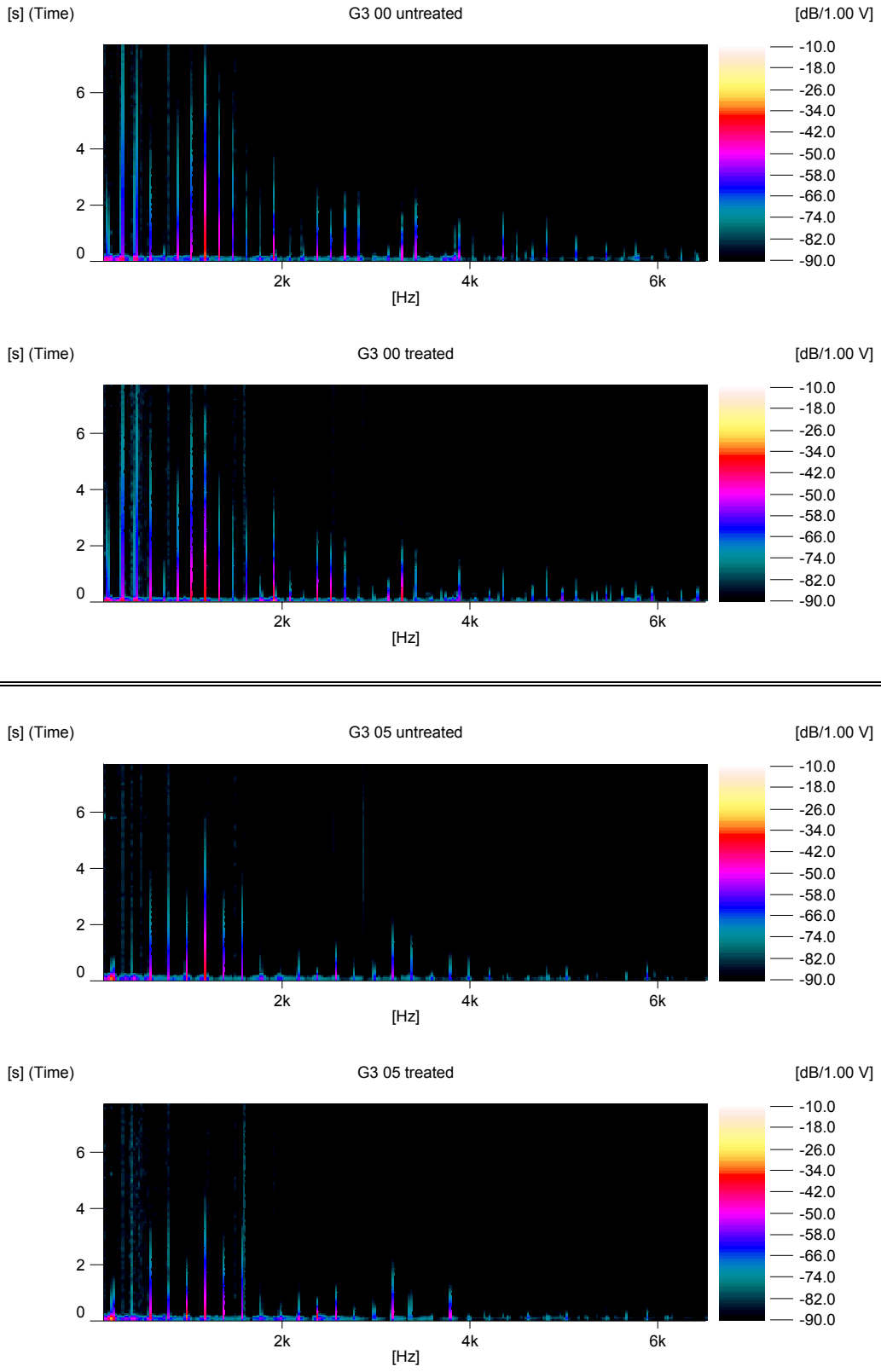

Figure C4-5 Taylor G3 00 and G3 05, treated and untreated

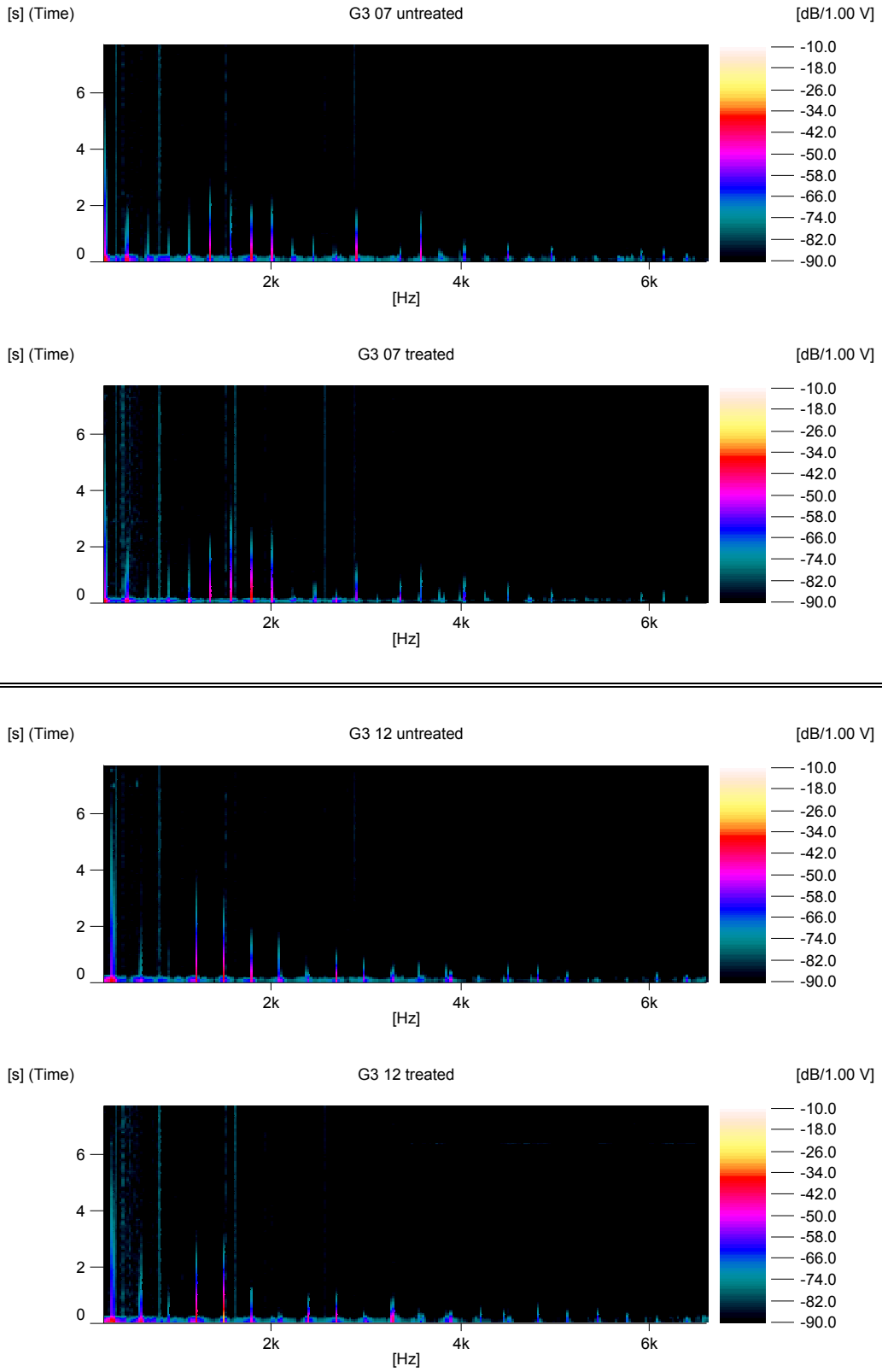

Figure C4-6 Taylor G3 07 and G3 12, treated and untreated

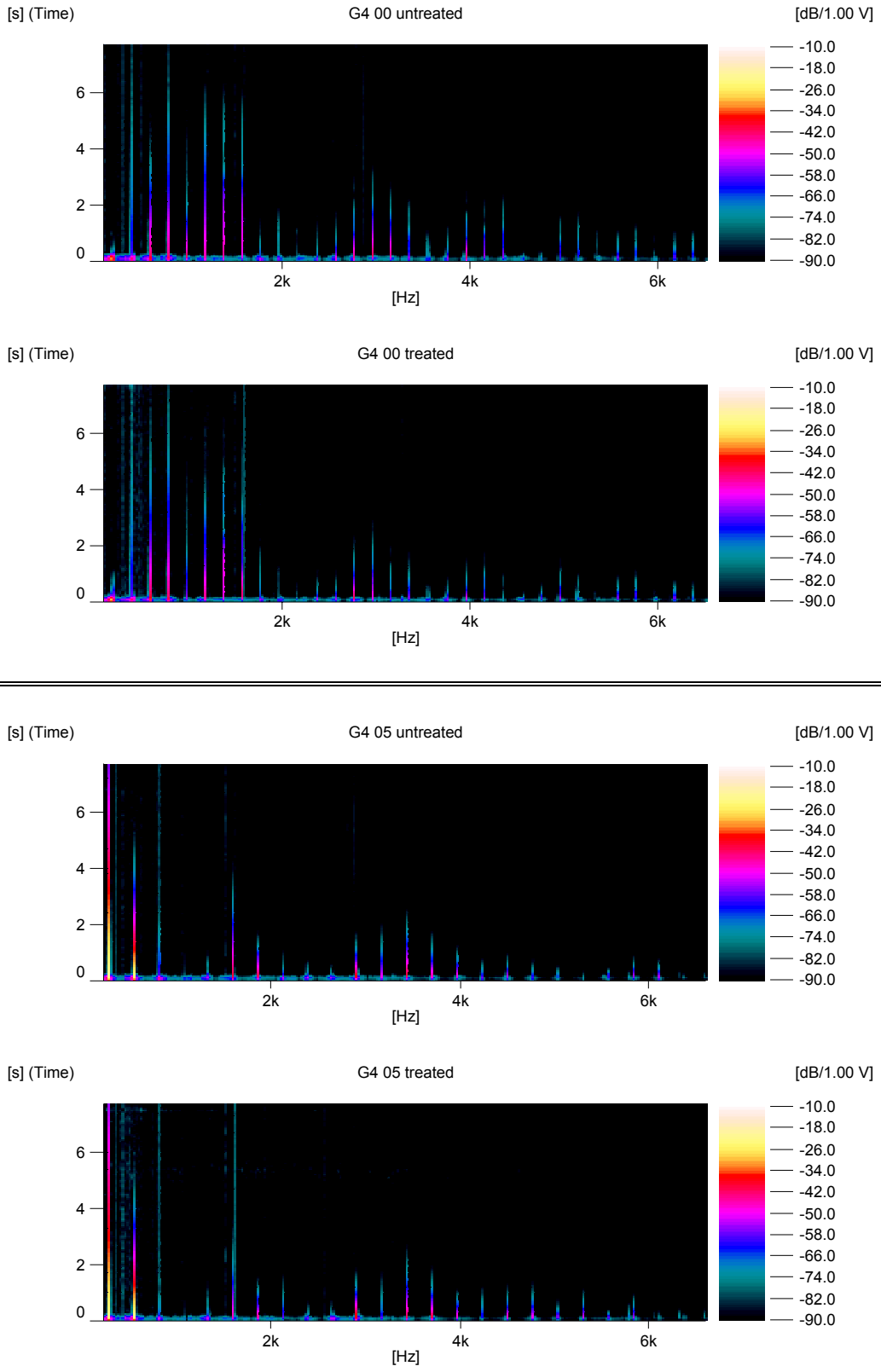

Figure C4-7 Taylor G4 00 and G4 05, treated and untreated

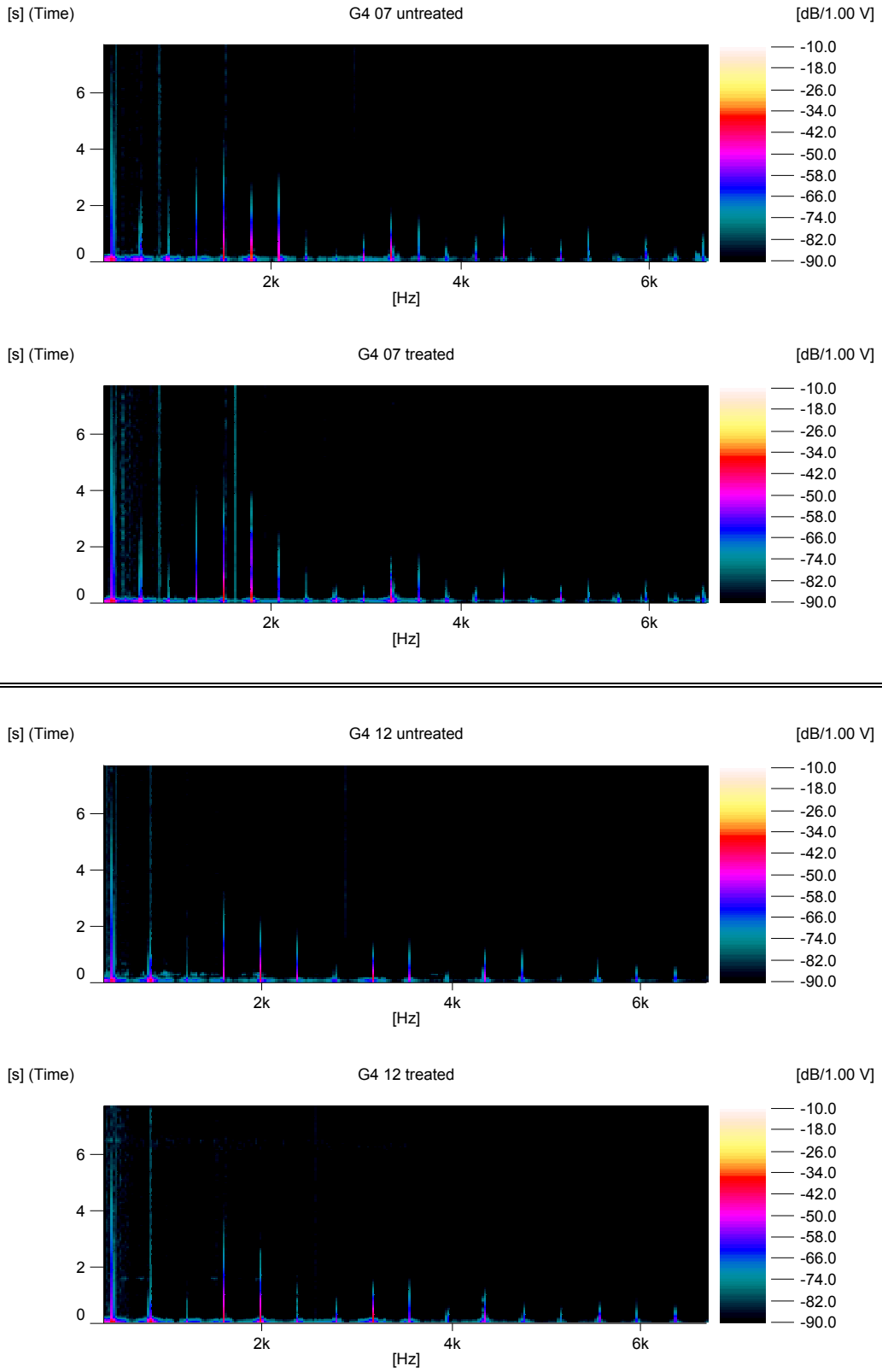

Figure C4-8 Taylor G4 07 and G4 12, treated and untreated

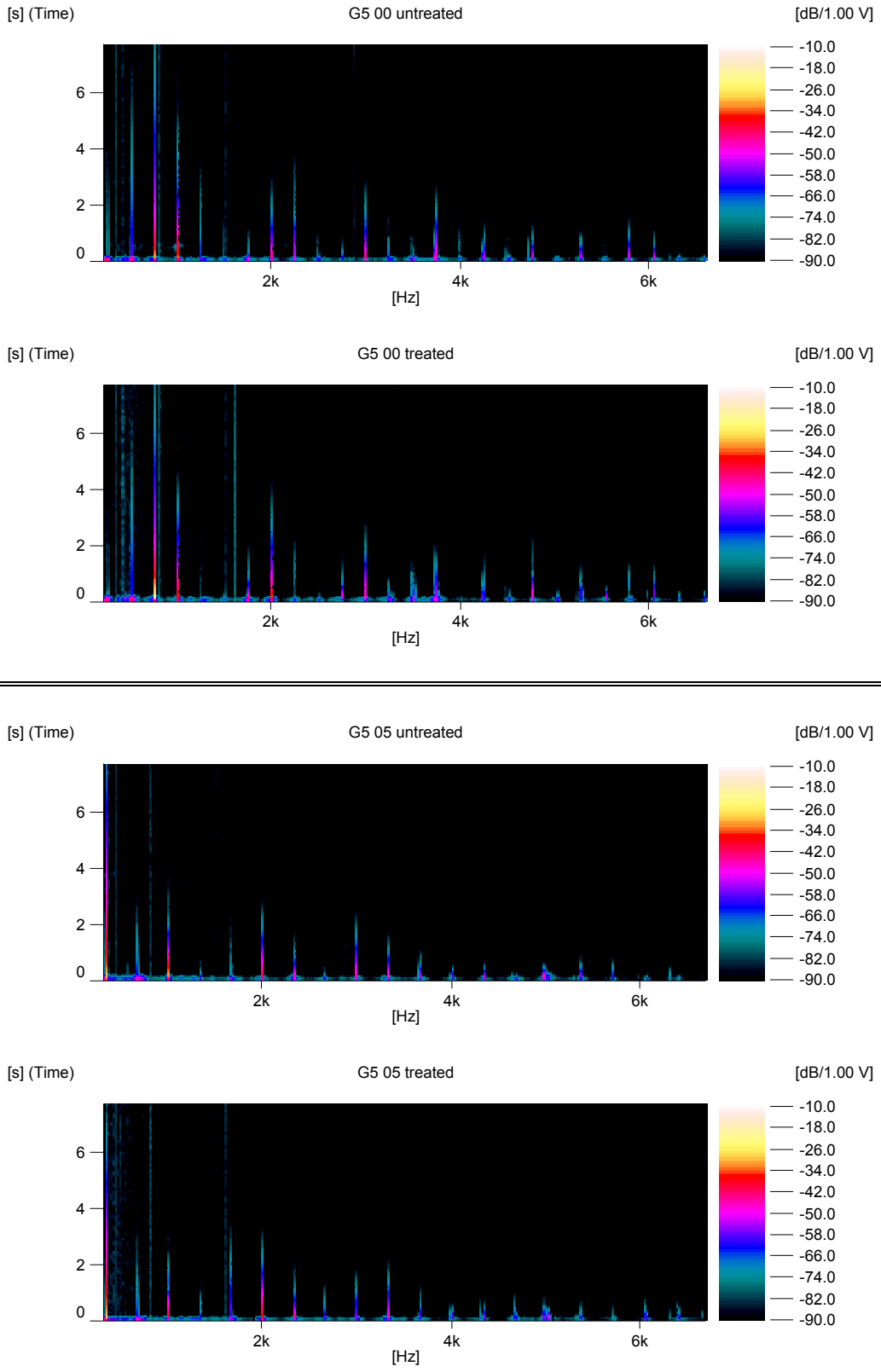

Figure C4-9 Taylor G5 00 and G5 05, treated and untreated

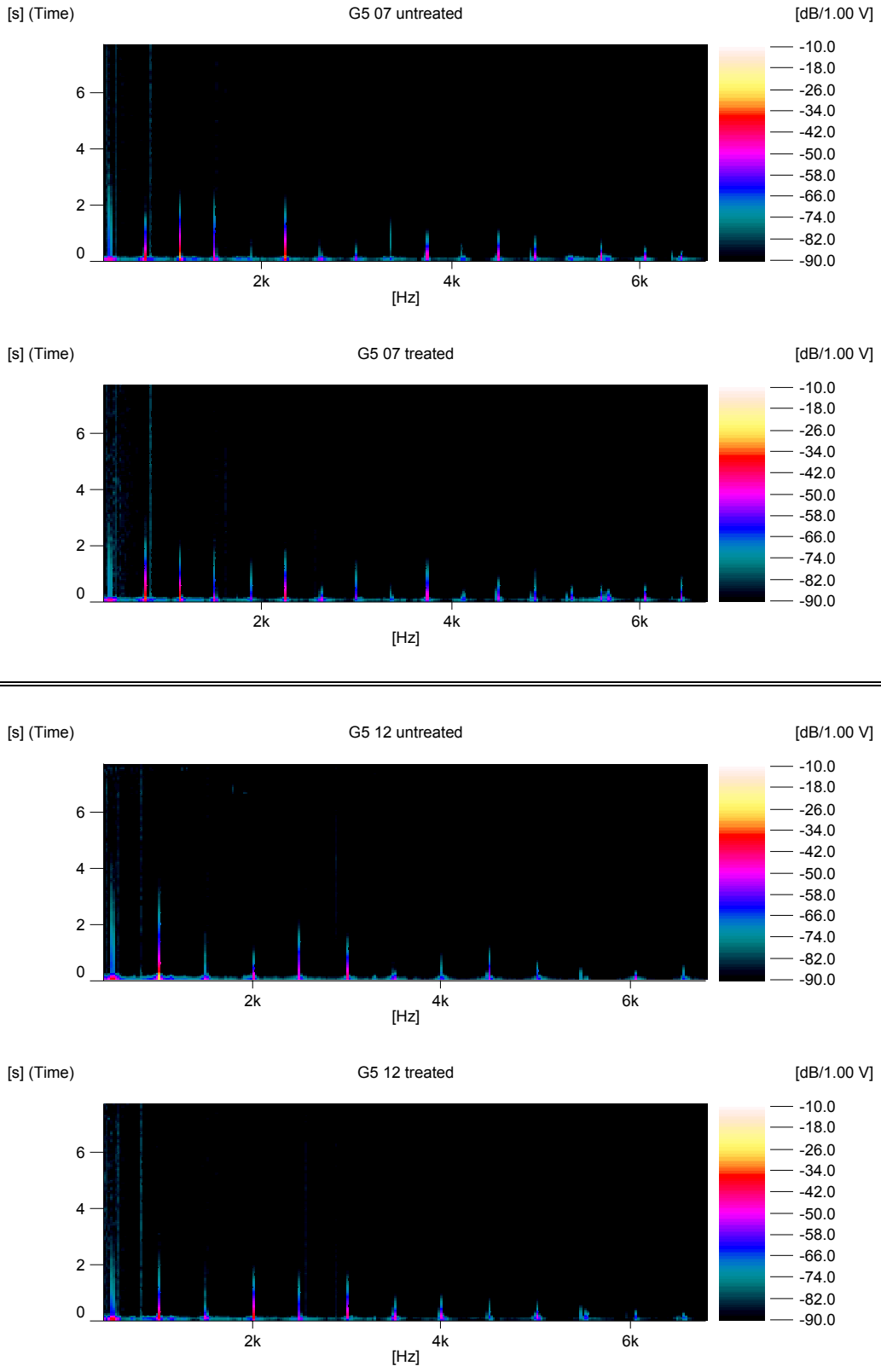

Figure C4-10 Taylor G5 07 and G5 12, treated and untreated

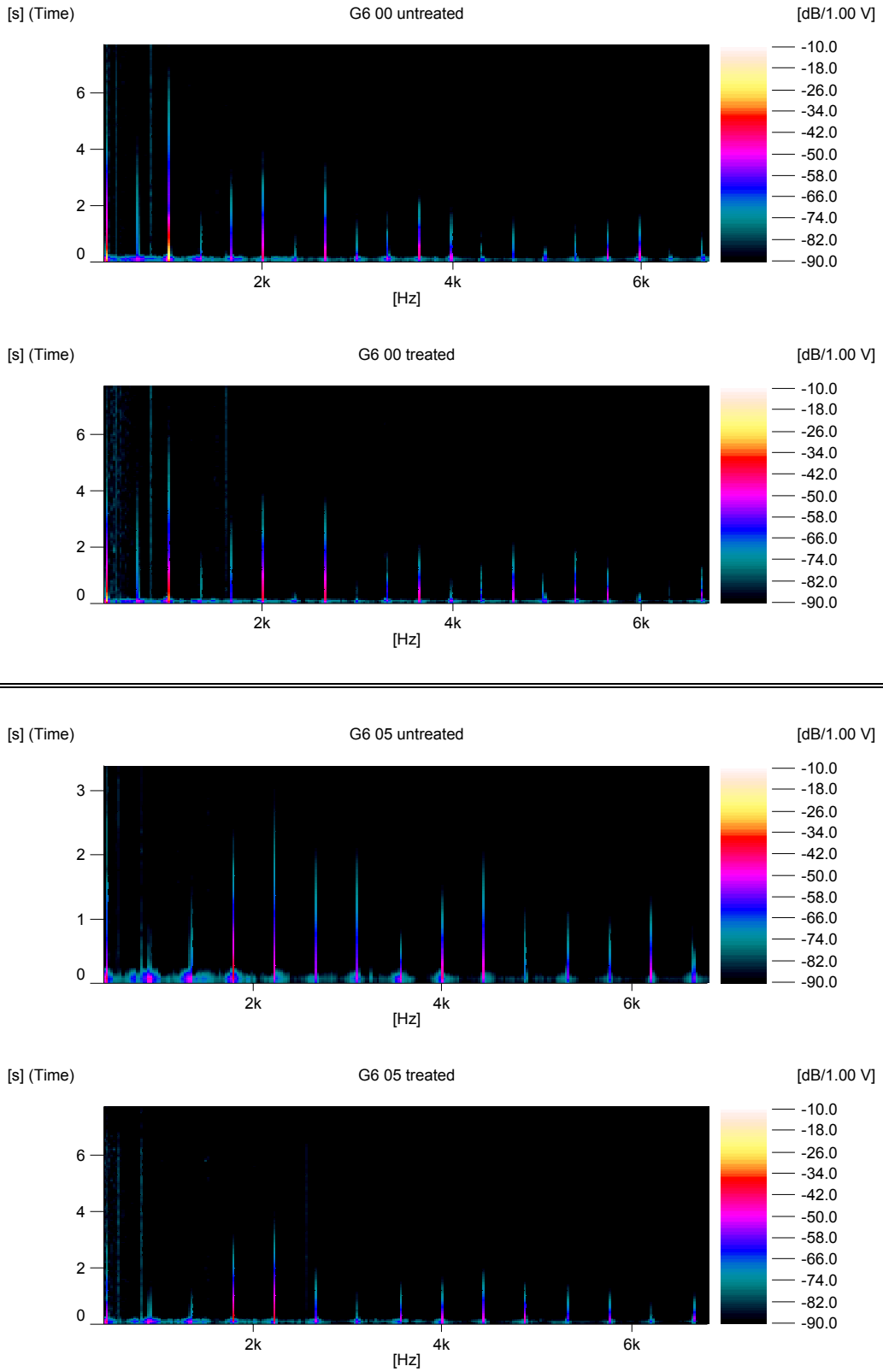

Figure C4-11 Taylor G6 00 and G6 05, treated and untreated

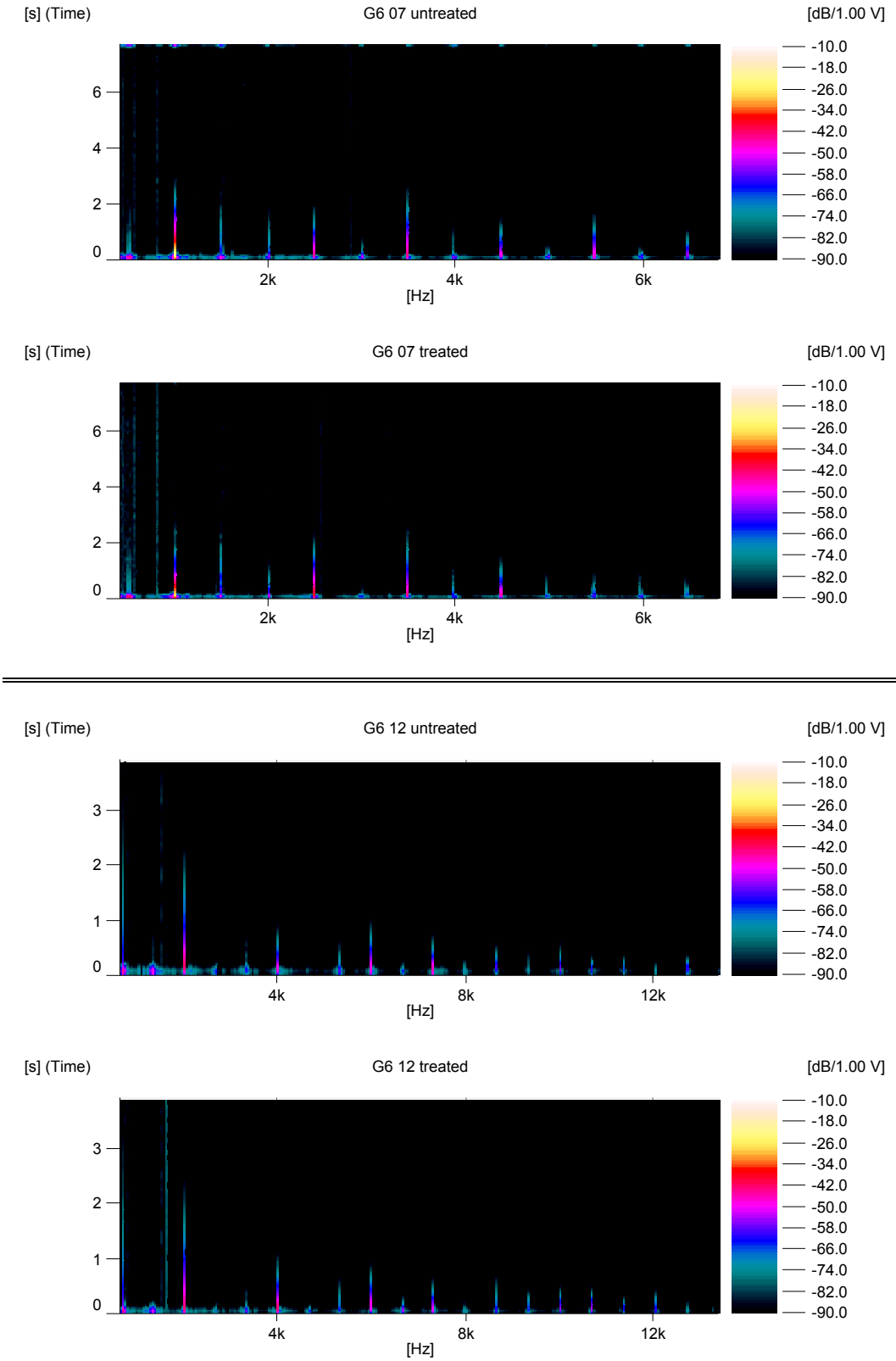

Figure C4-12 Taylor G6 07 and G6 12, treated and untreated

C5 Partial Energy Distribution, Monochord Test

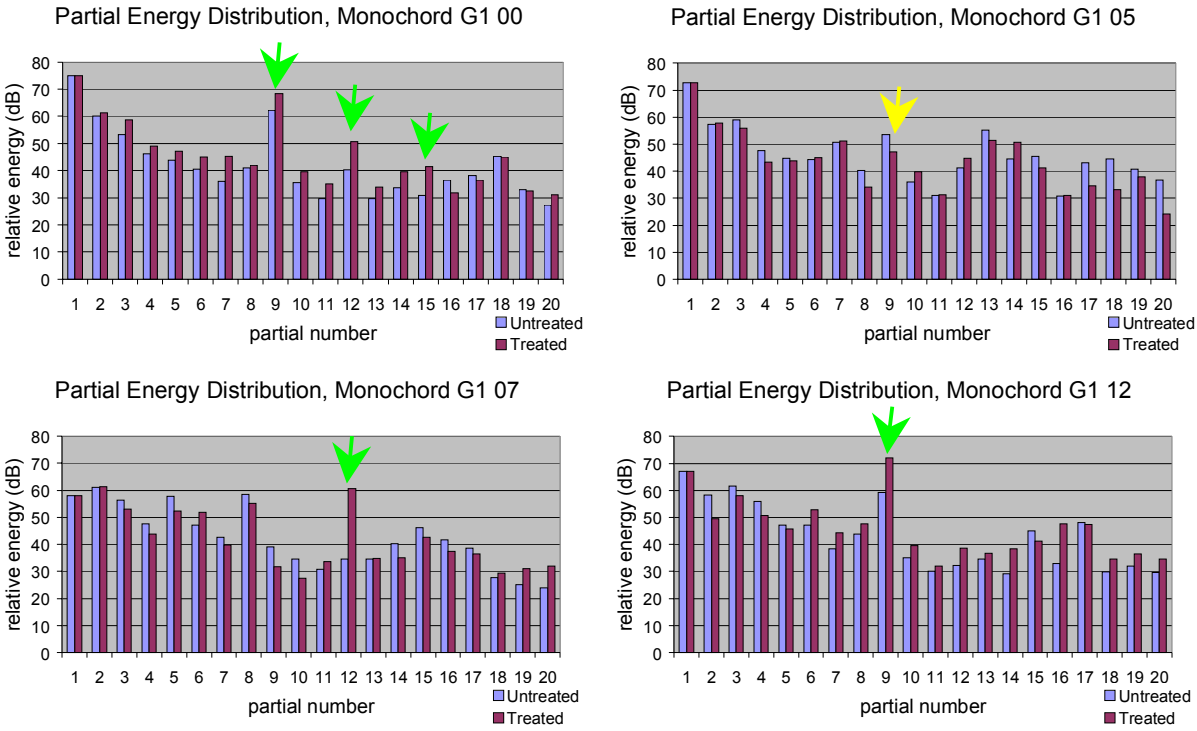

Figure C5-1 Partial Energy Distribution for Treated and Untreated G1 strings, at various positions. Monochord Test. G1 00, G1 05, G1 07 and G1 12.

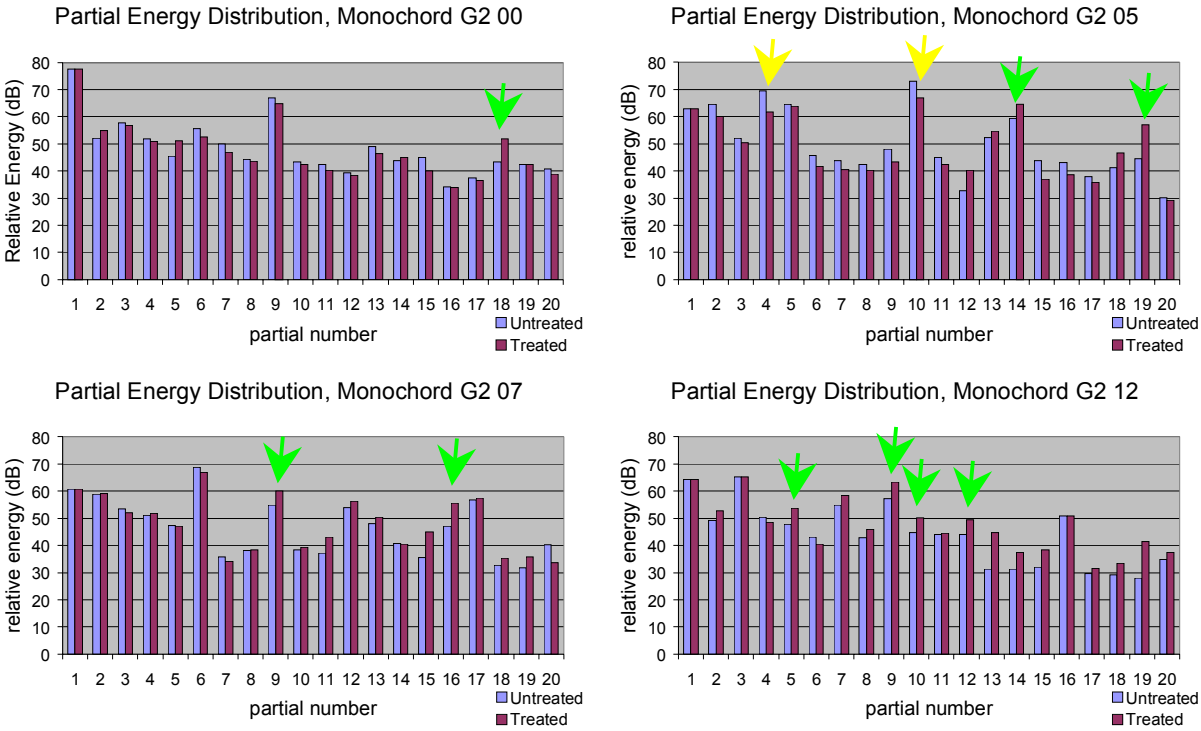

Figure C5-2 Partial Energy Distribution for Treated and Untreated G2 strings, at various positions. Monochord Test. G2 00, G2 05, G2 07 and G2 12.

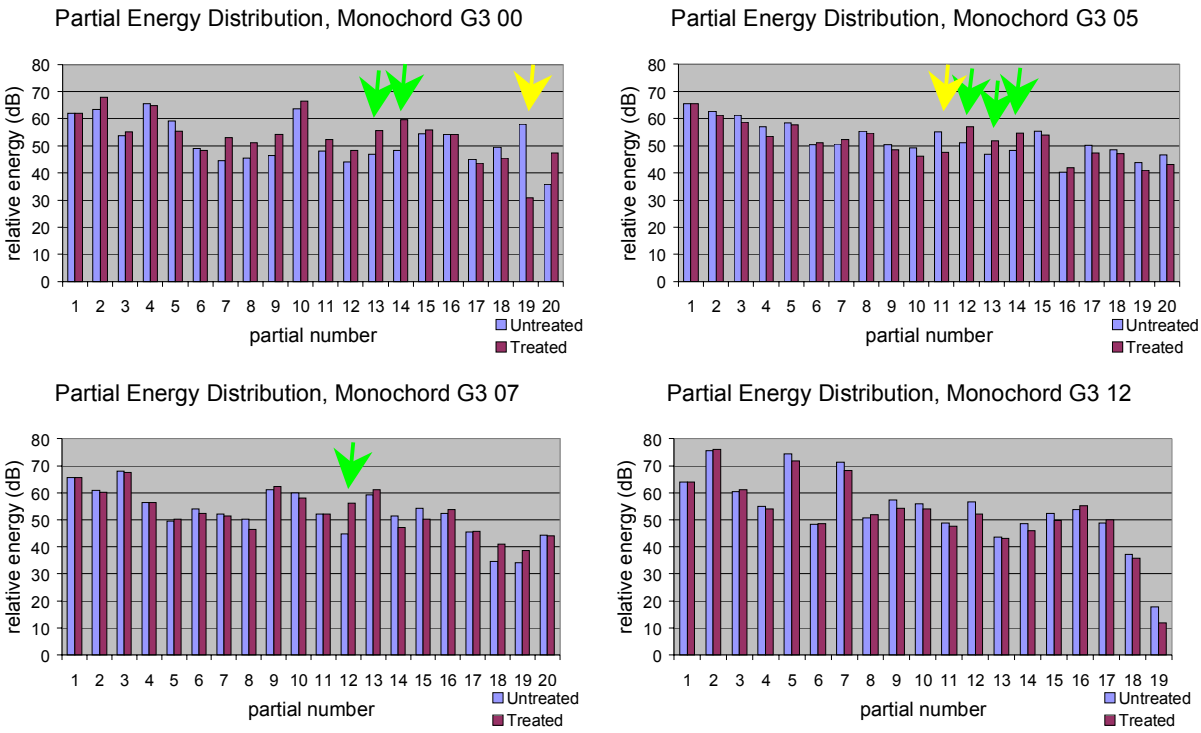

Figure C5-3 Partial Energy Distribution for Treated and Untreated G3 strings, at various positions. Monochord Test. G3 00, G3 05, G3 07 and G3 12.

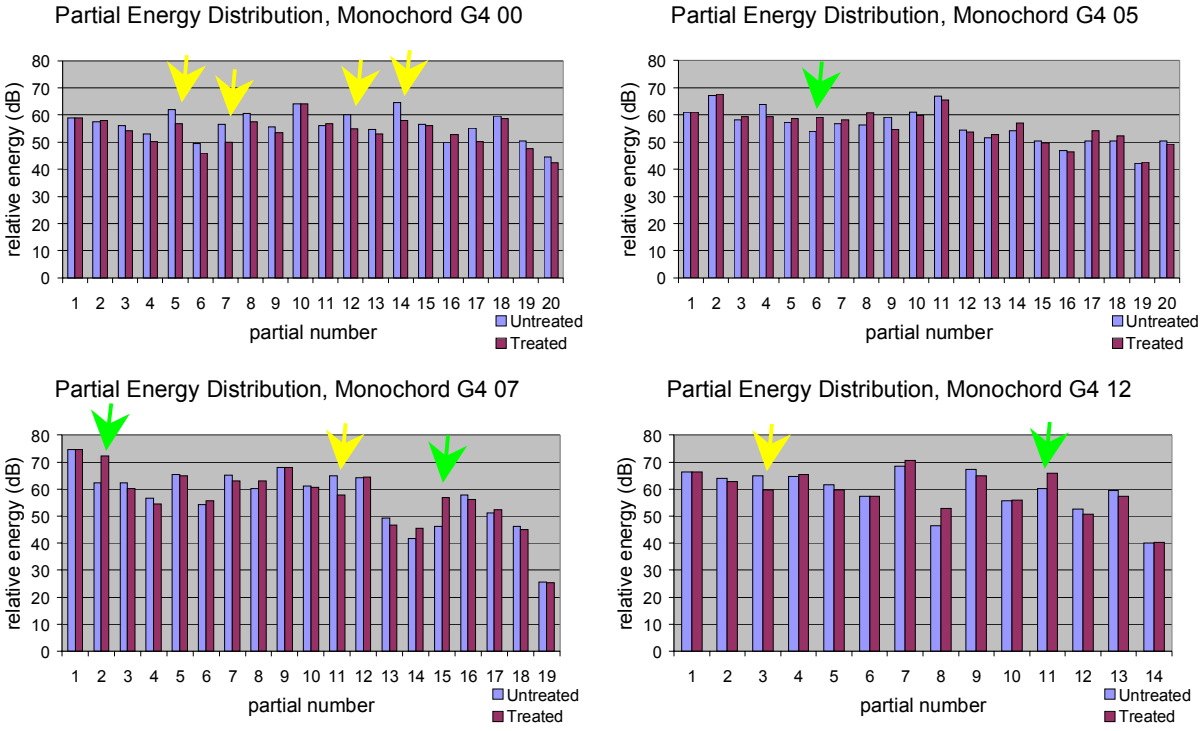

Figure C5-4 Partial Energy Distribution for Treated and Untreated G4 strings, at various positions. Monochord Test. G4 00, G4 05, G4 07 and G4 12.

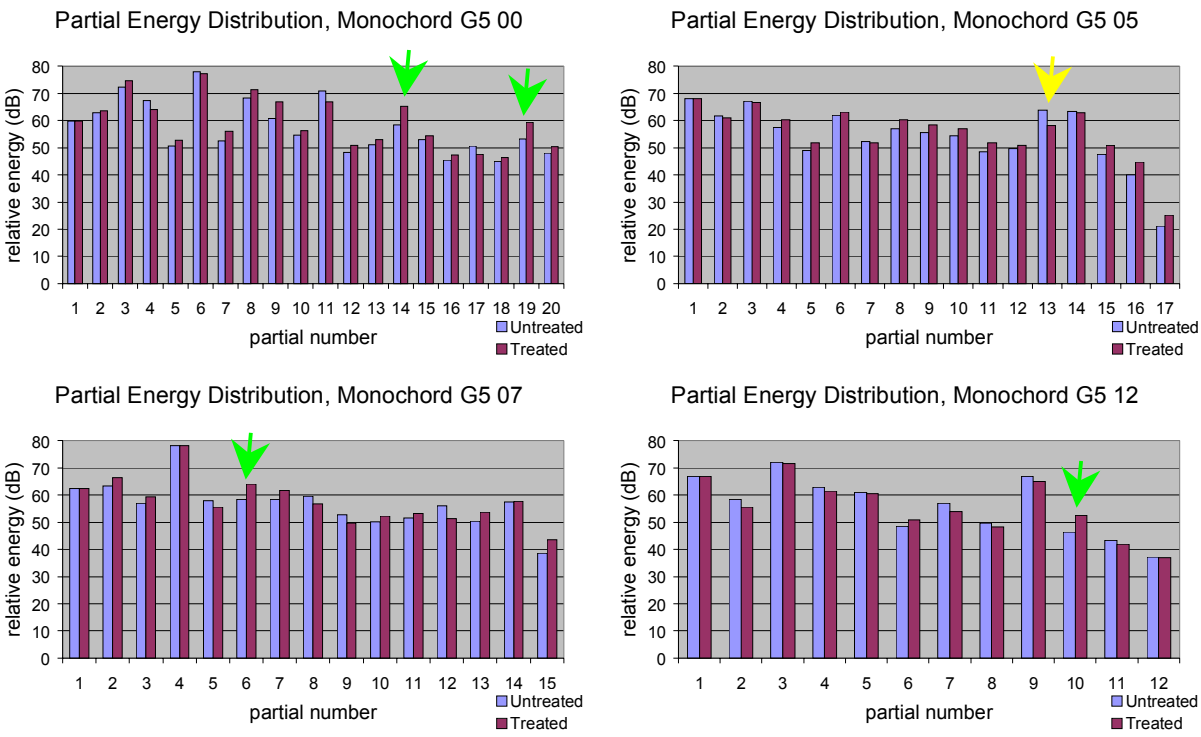

Figure C5-5 Partial Energy Distribution for Treated and Untreated G5 strings, at various positions. Monochord Test. G5 00, G5 05, G5 07 and G5 12.

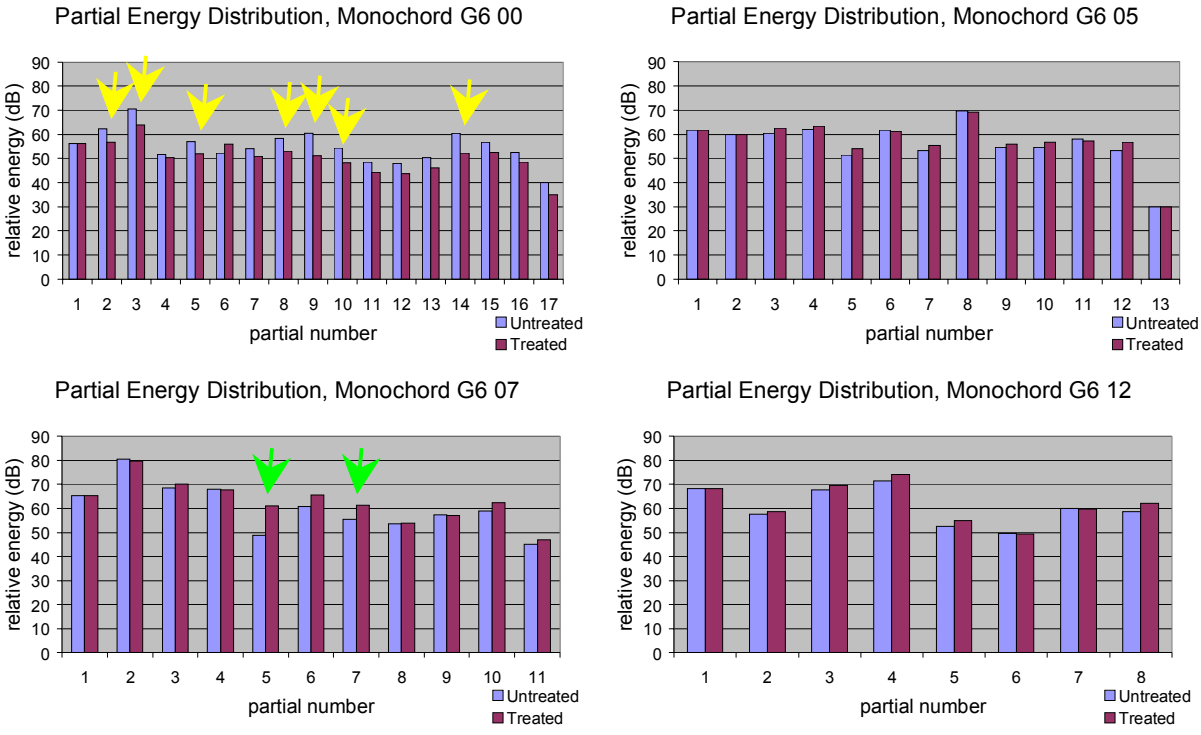

Figure C5-6 Partial Energy Distribution for Treated and Untreated G6 strings, at various positions. Monochord Test. G6 00, G6 05, G6 07 and G6 12.

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C6 Partial Energy Distribution, Soundbox Test

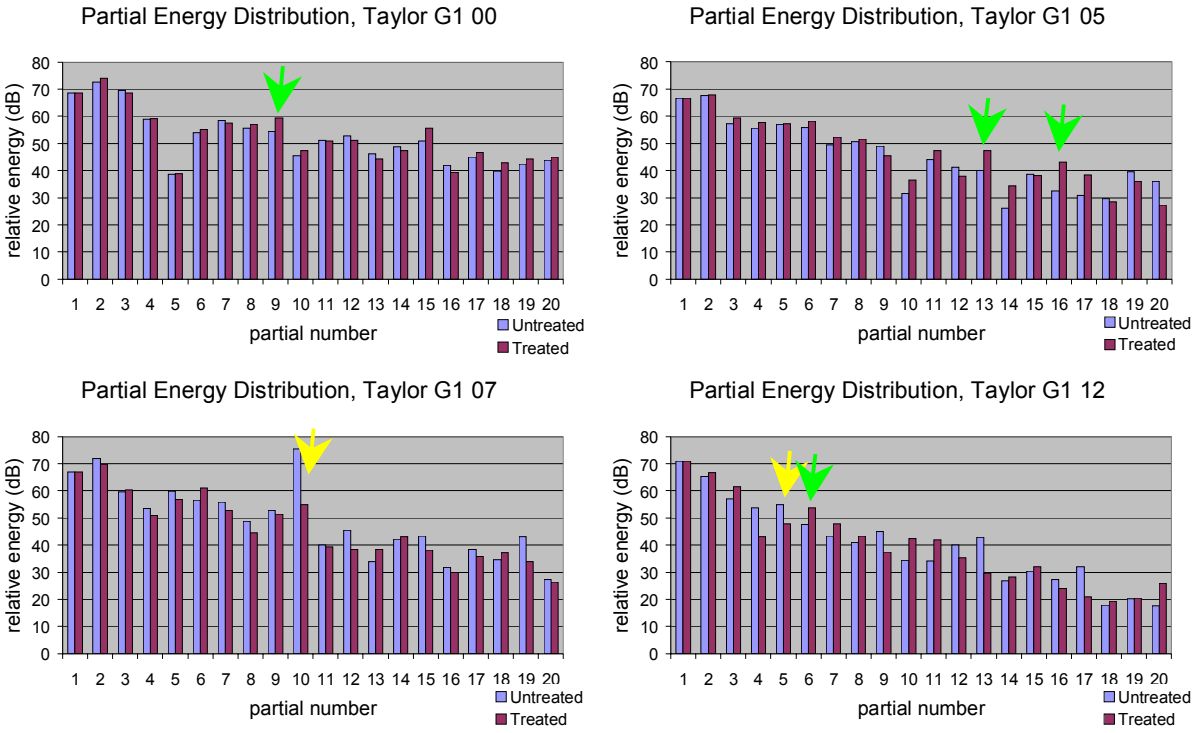

Figure C6-1 Partial Energy Distribution for Treated and Untreated G1 strings, at various positions. Soundbox Test. G1 00, G1 05, G1 07 and G1 12.

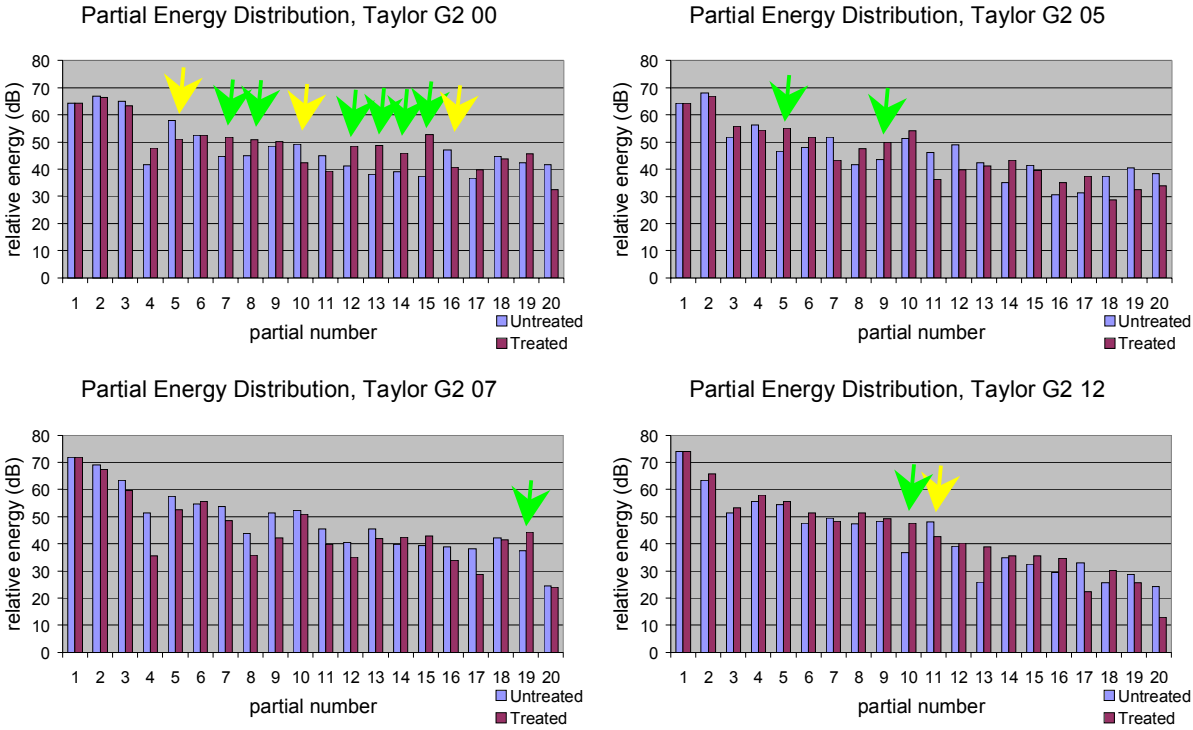

Figure C6-2 Partial Energy Distribution for Treated and Untreated G2 strings, at various positions. Soundbox Test. G2 00, G2 05, G2 07 and G2 12.

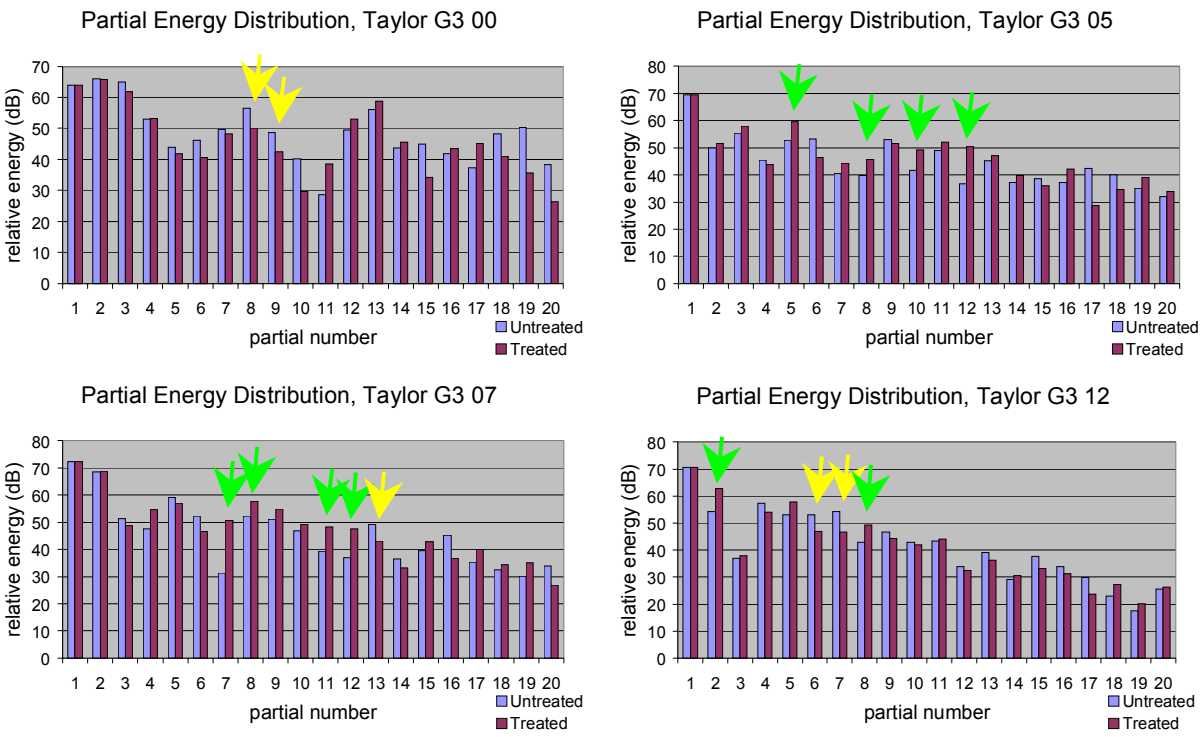

Figure C6-3 Partial Energy Distribution for Treated and Untreated G3 strings, at various positions. Soundbox Test. G3 00, G3 05, G3 07 and G3 12.

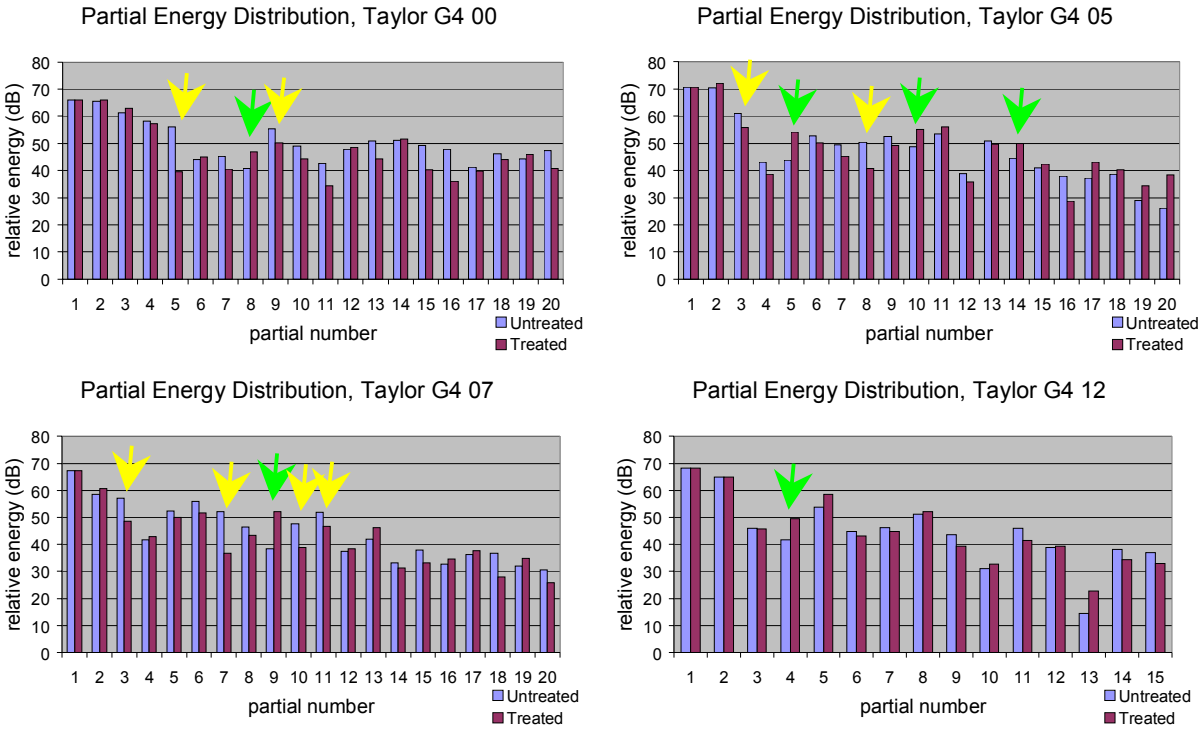

Figure C6-4 Partial Energy Distribution for Treated and Untreated G4 strings, at various positions. Soundbox Test. G4 00, G4 05, G4 07 and G4 12.

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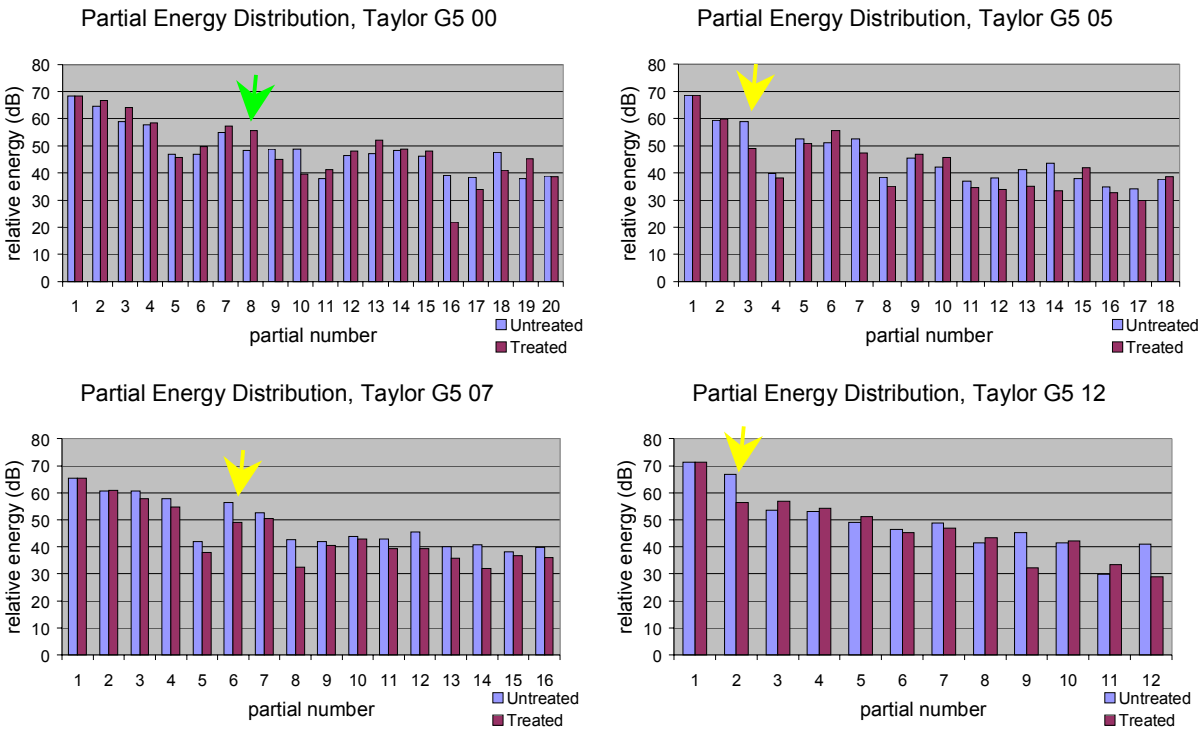

Figure C6-5 Partial Energy Distribution for Treated and Untreated G5 strings, at various positions. Soundbox Test. G5 00, G5 05, G5 07 and G5 12.

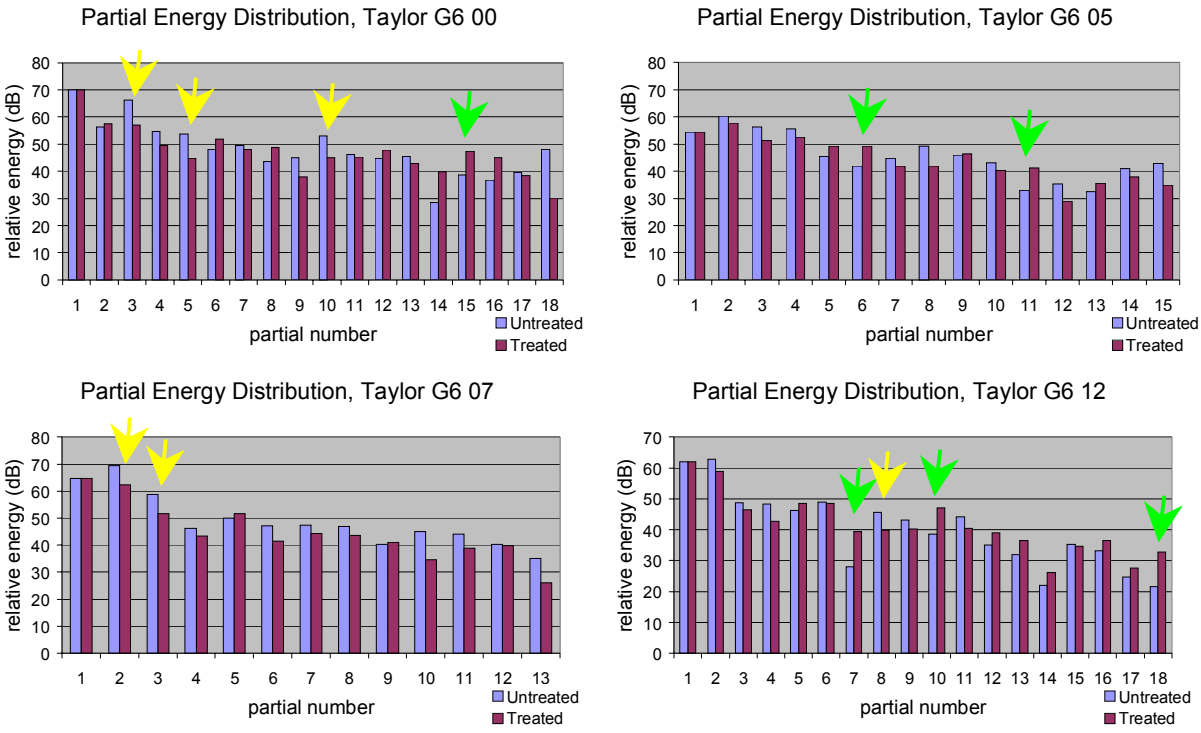

Figure C6-6 Partial Energy Distribution for Treated and Untreated G6 strings, at various positions. Soundbox Test. G6 00, G6 05, G6 07 and G6 12

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C7 Partial Decay Slices, Monochord Test

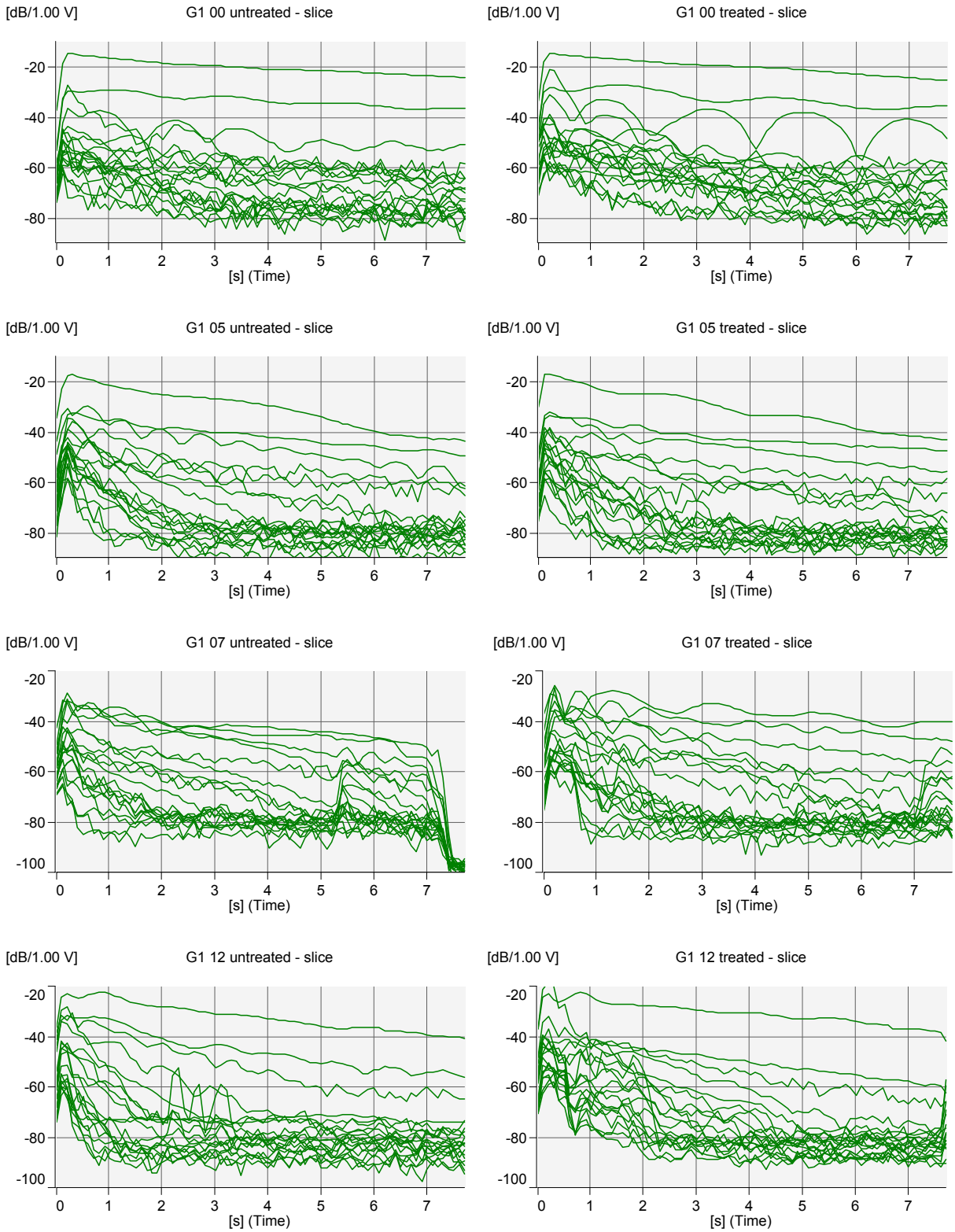

Figure C7-1 Partial decay slices of Monochord G1 00, 05, 07 and 12, first twenty partials.

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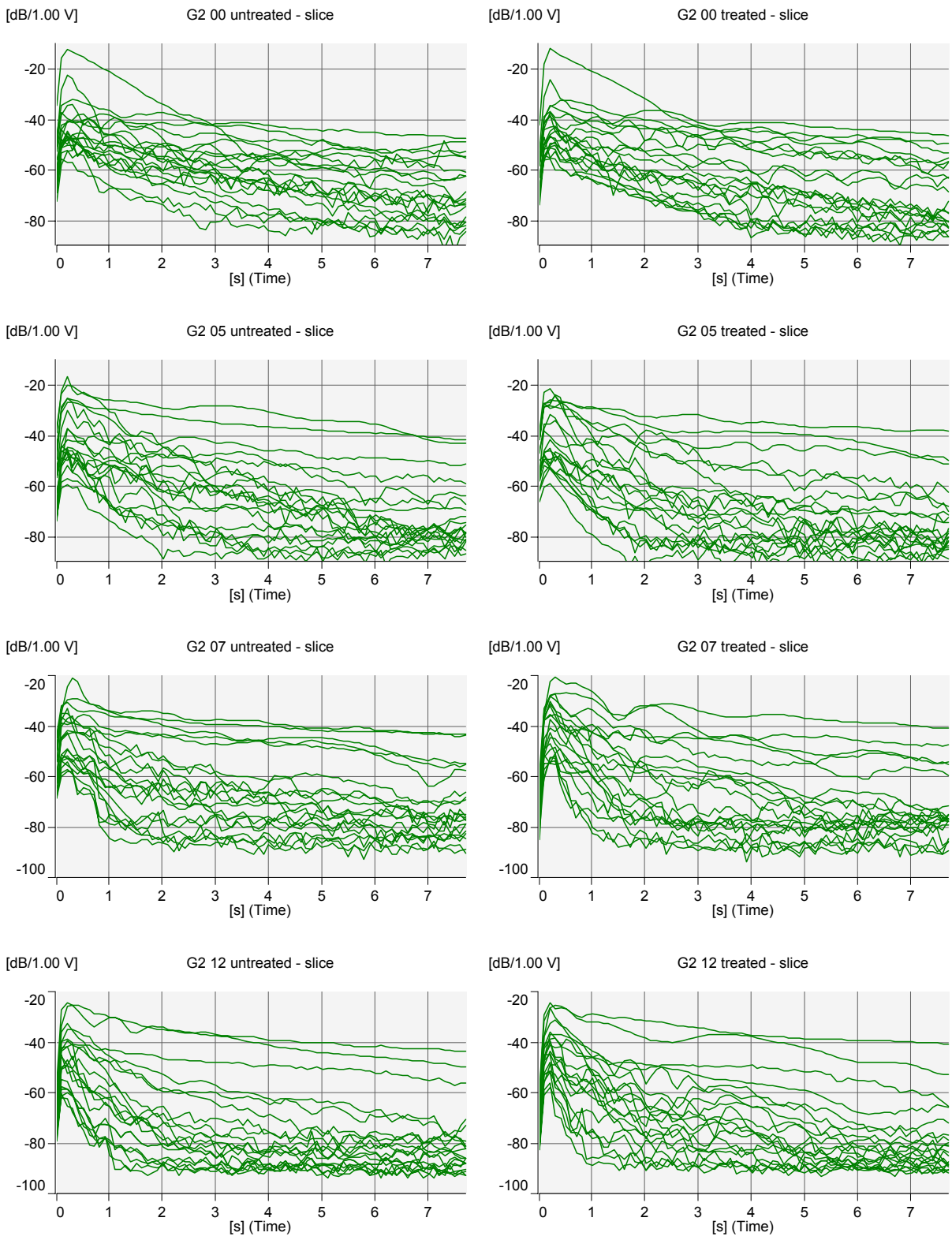

Figure C7-2 Partial decay slices of Monochord G2 00, 05, 07 and 12, first twenty partials.

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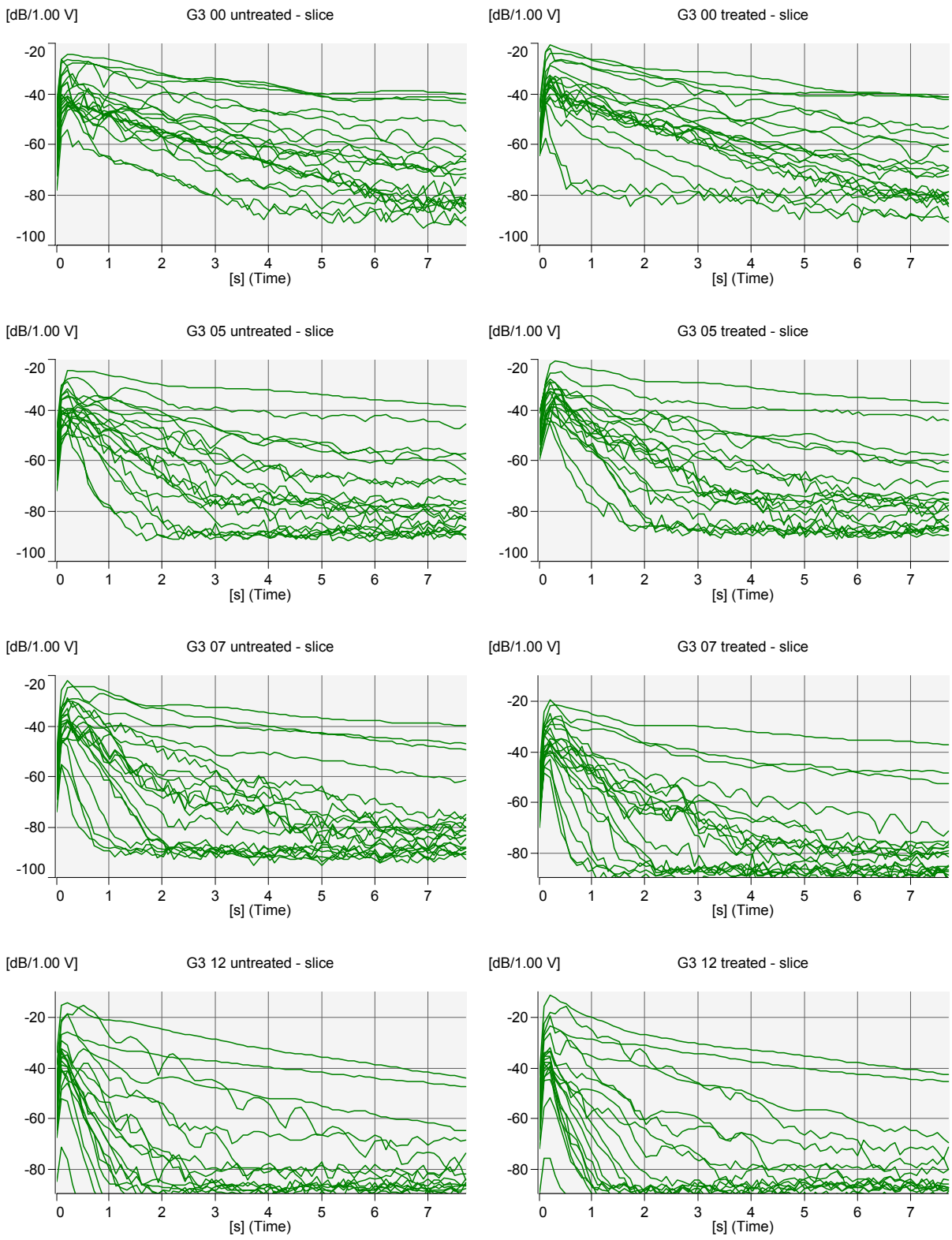

Figure C7-3 Partial decay slices of Monochord G3 00, 05, 07 and 12, first twenty partials.

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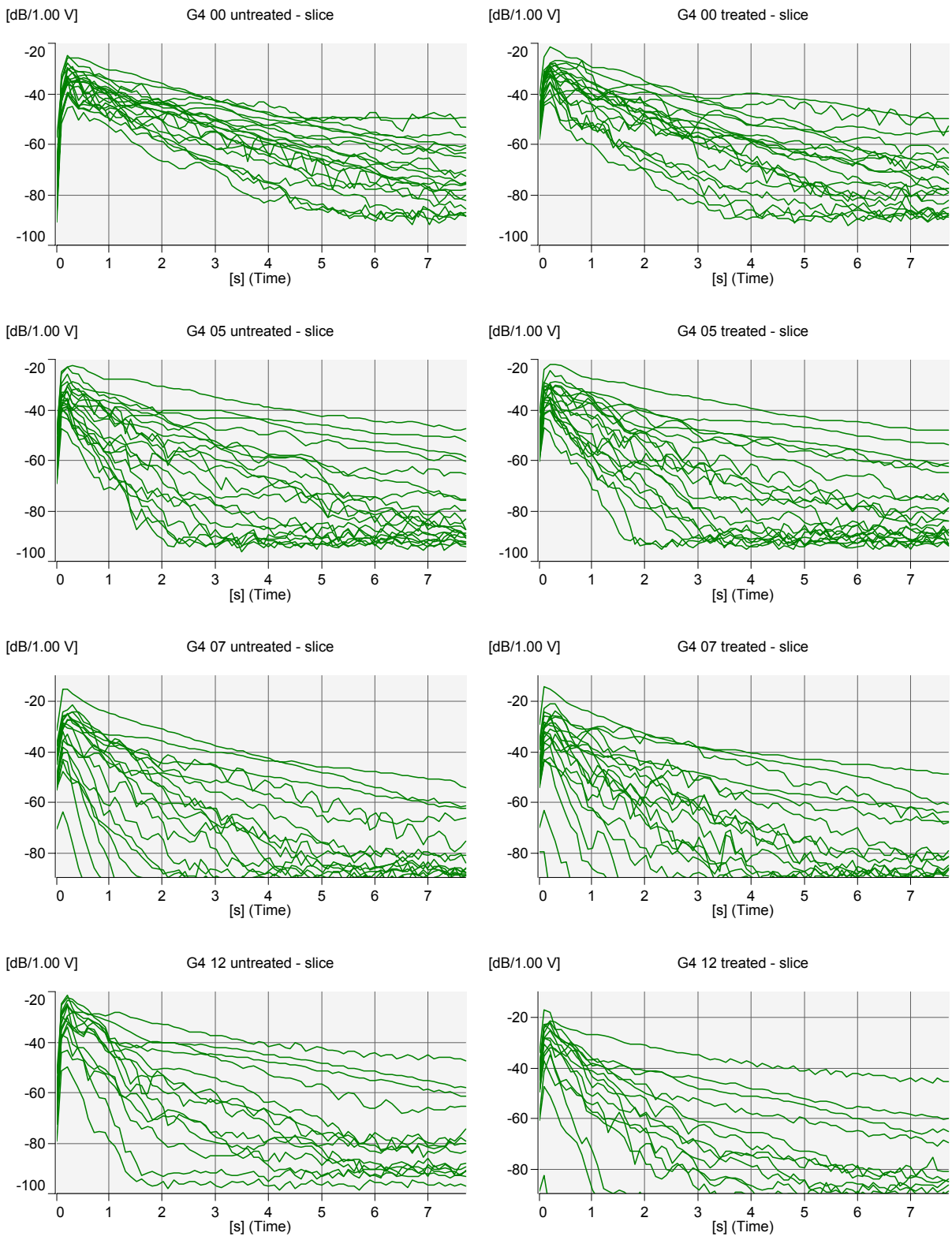

Figure C7-4 Partial decay slices of Monochord G4 00, 05, 07 and 12, first twenty partials.

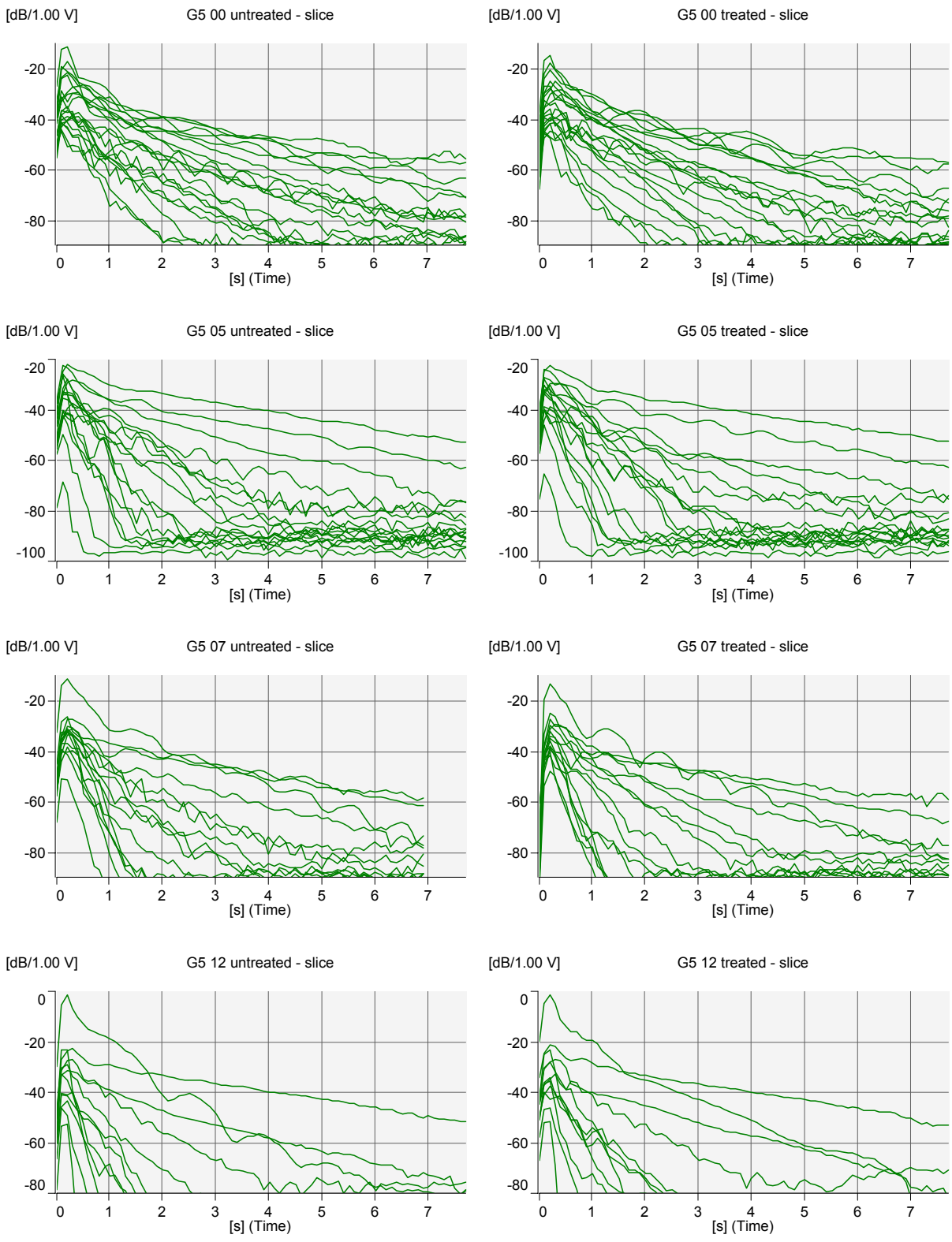

Figure C7-5 Partial decay slices of Monochord G5 00, 05, 07 and 12, first twenty partials.

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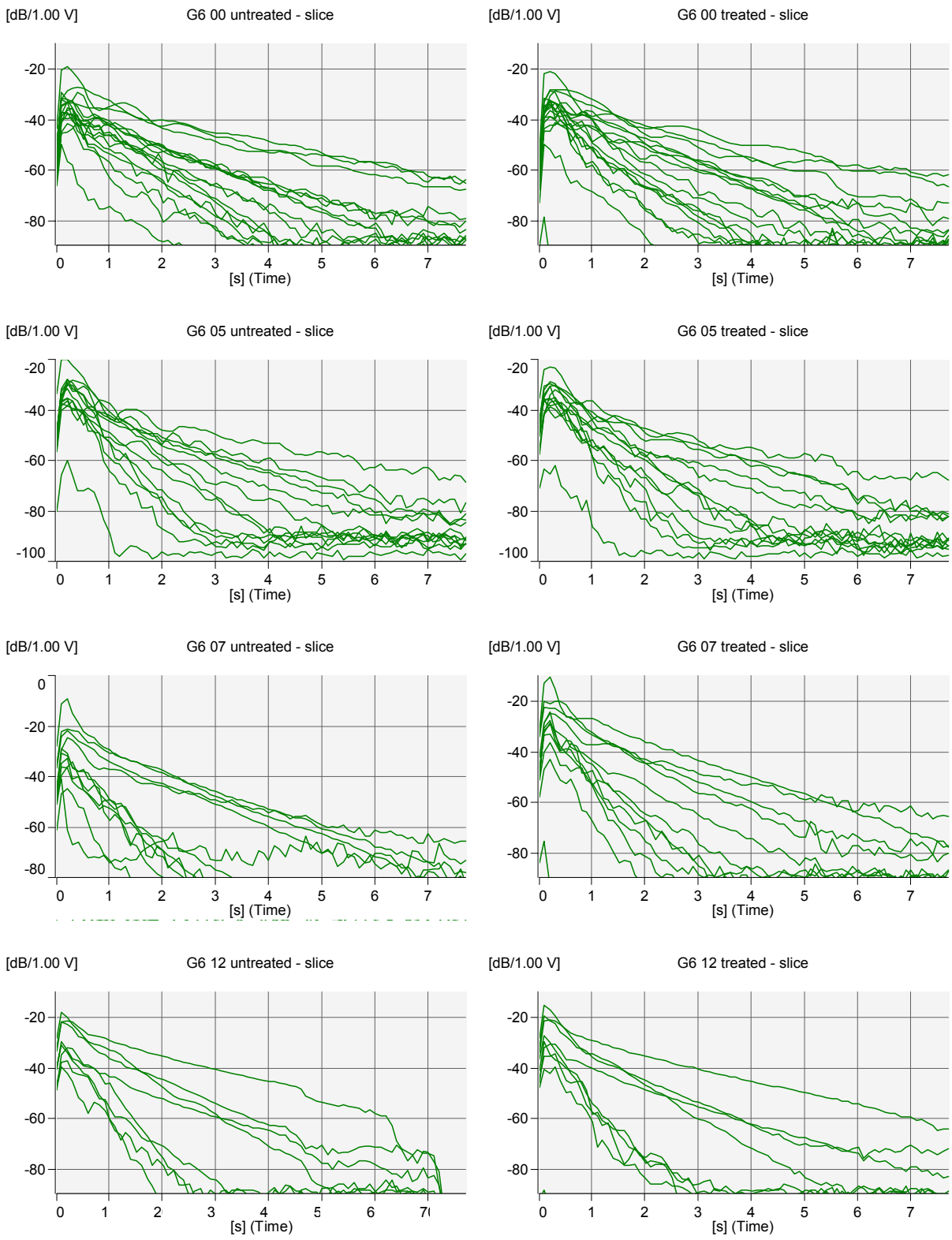


Figure C7-6 Partial decay slices of Monochord G6 00, 05, 07 and 12, first twenty partials.

C8 Partial Decay Slices, Soundbox Test

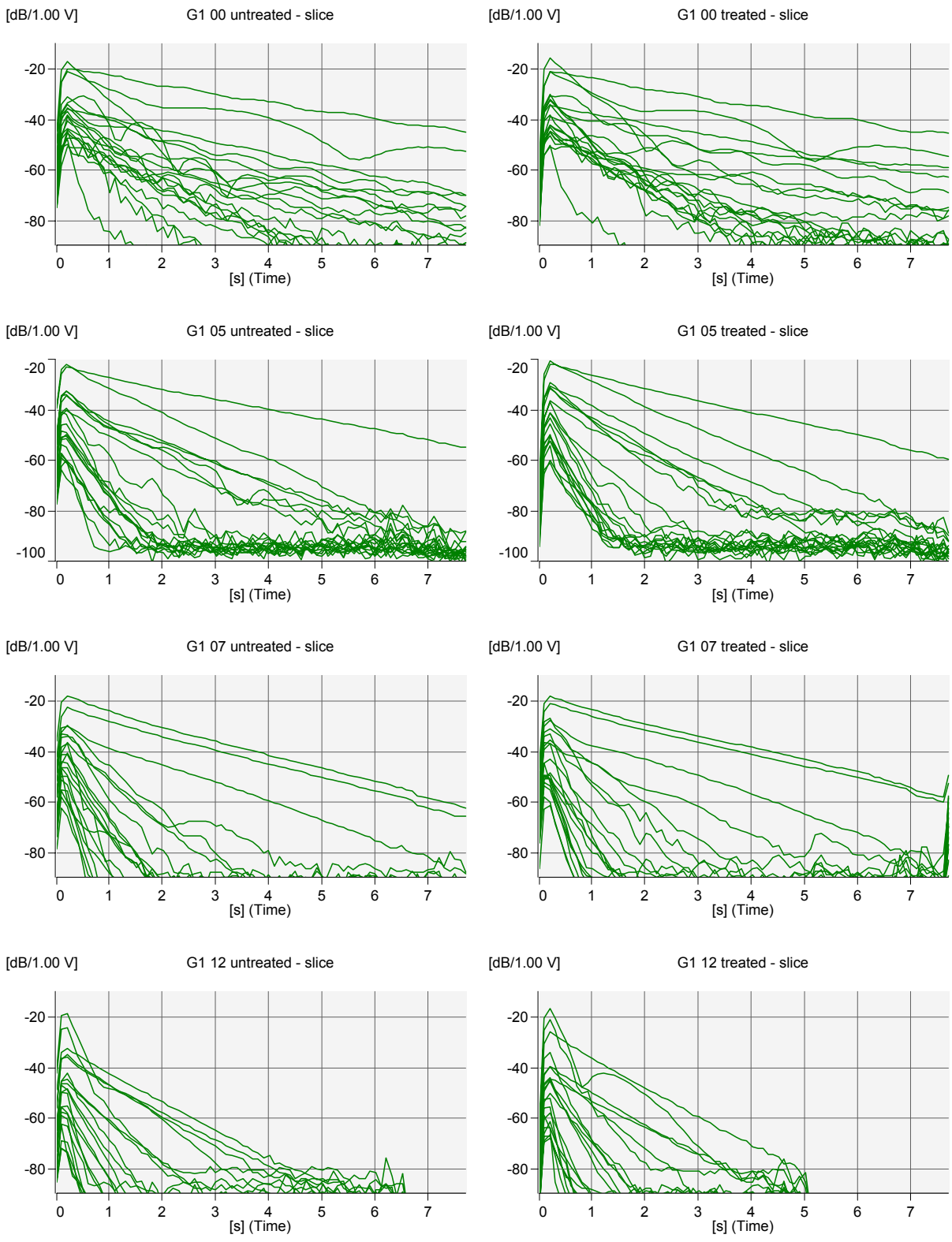


Figure C8-1 Partial decay slices of Taylor G1 00, 05, 07 and 12, first twenty partials.

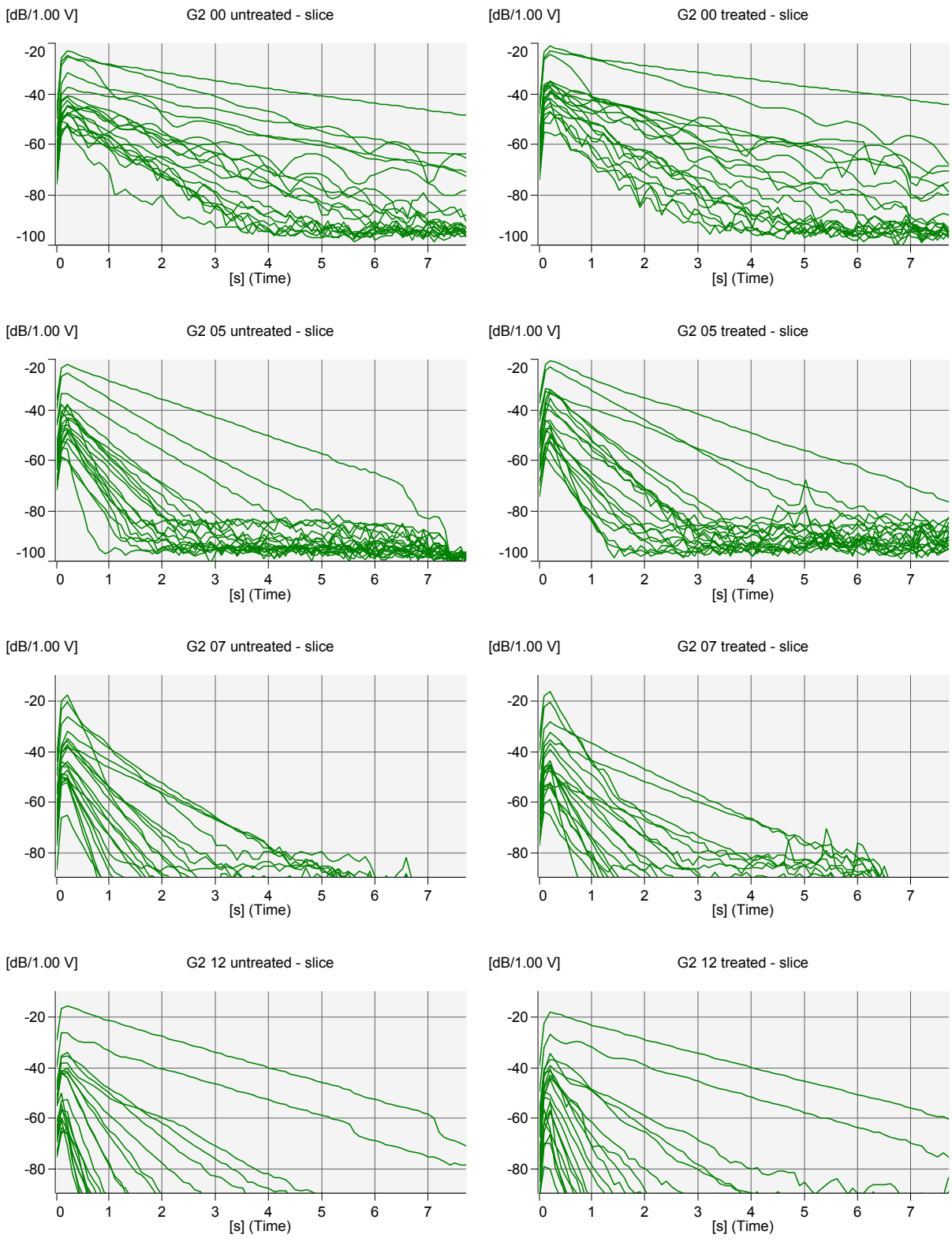


Figure C8-2 Partial decay slices of Taylor G2 00, 05, 07 and 12, first twenty partials.

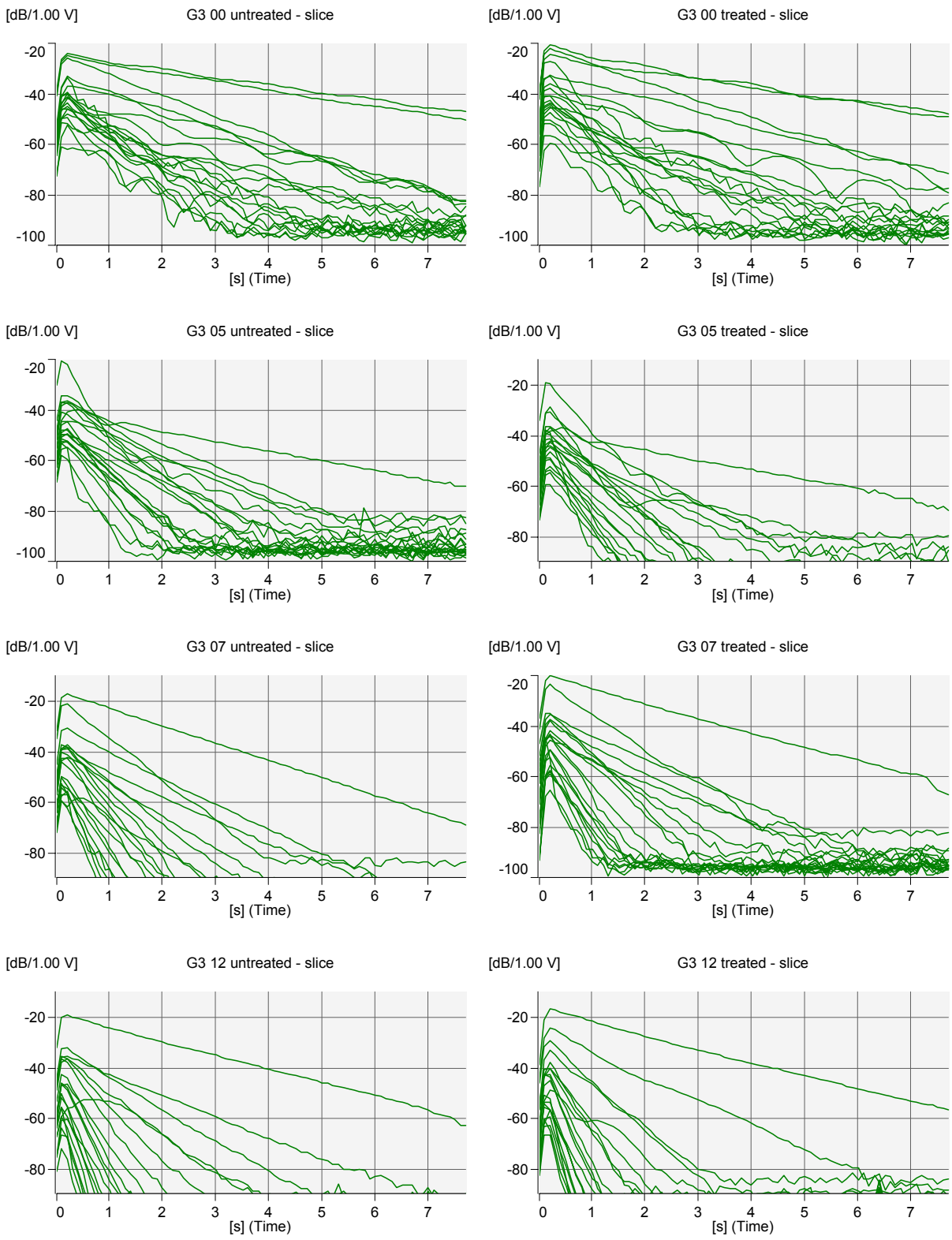


Figure C8-3 Partial decay slices of Taylor G3 00, 05, 07 and 12, first twenty partials.

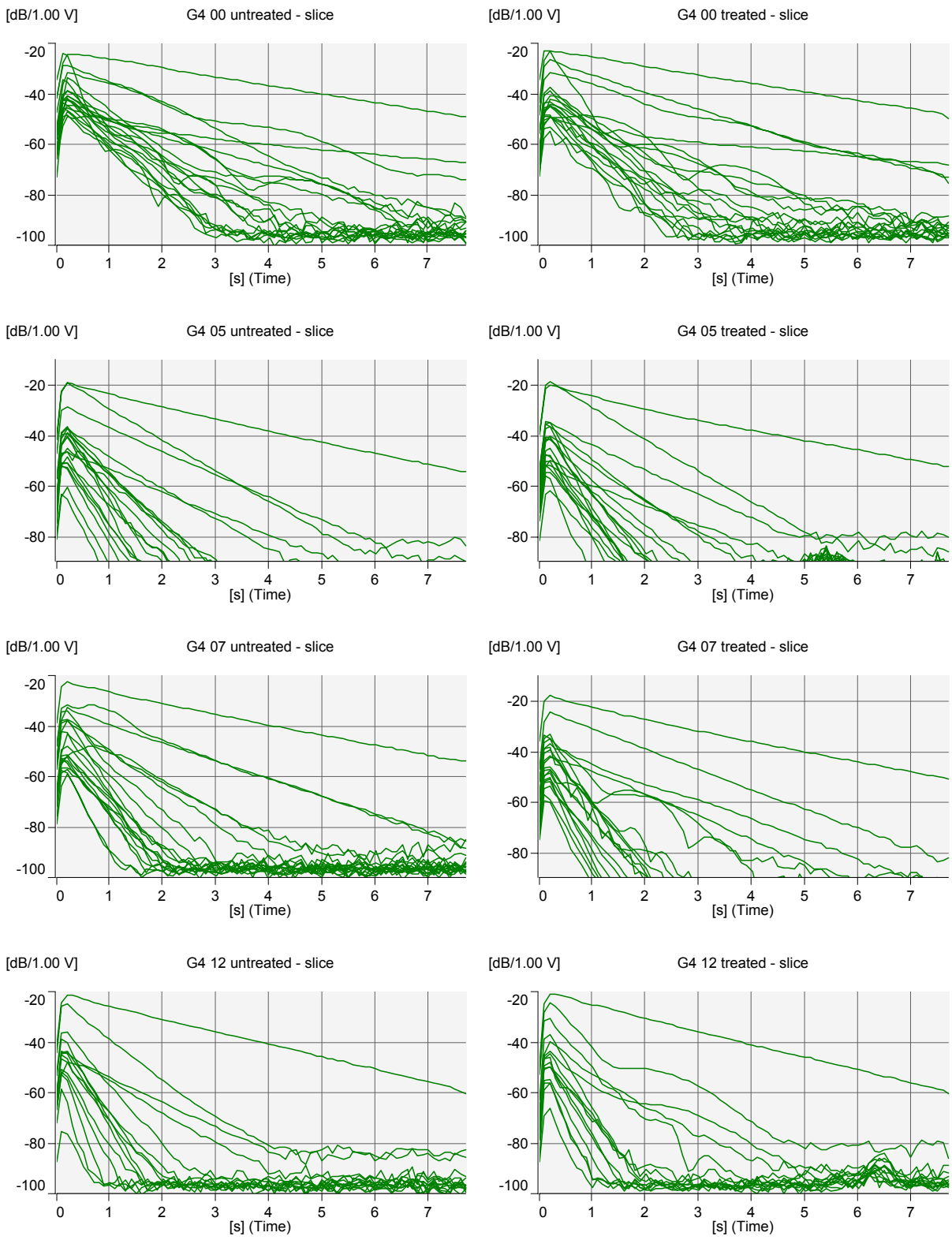


Figure C8-4 Partial decay slices of Taylor G4 00, 05, 07 and 12, first twenty partials.

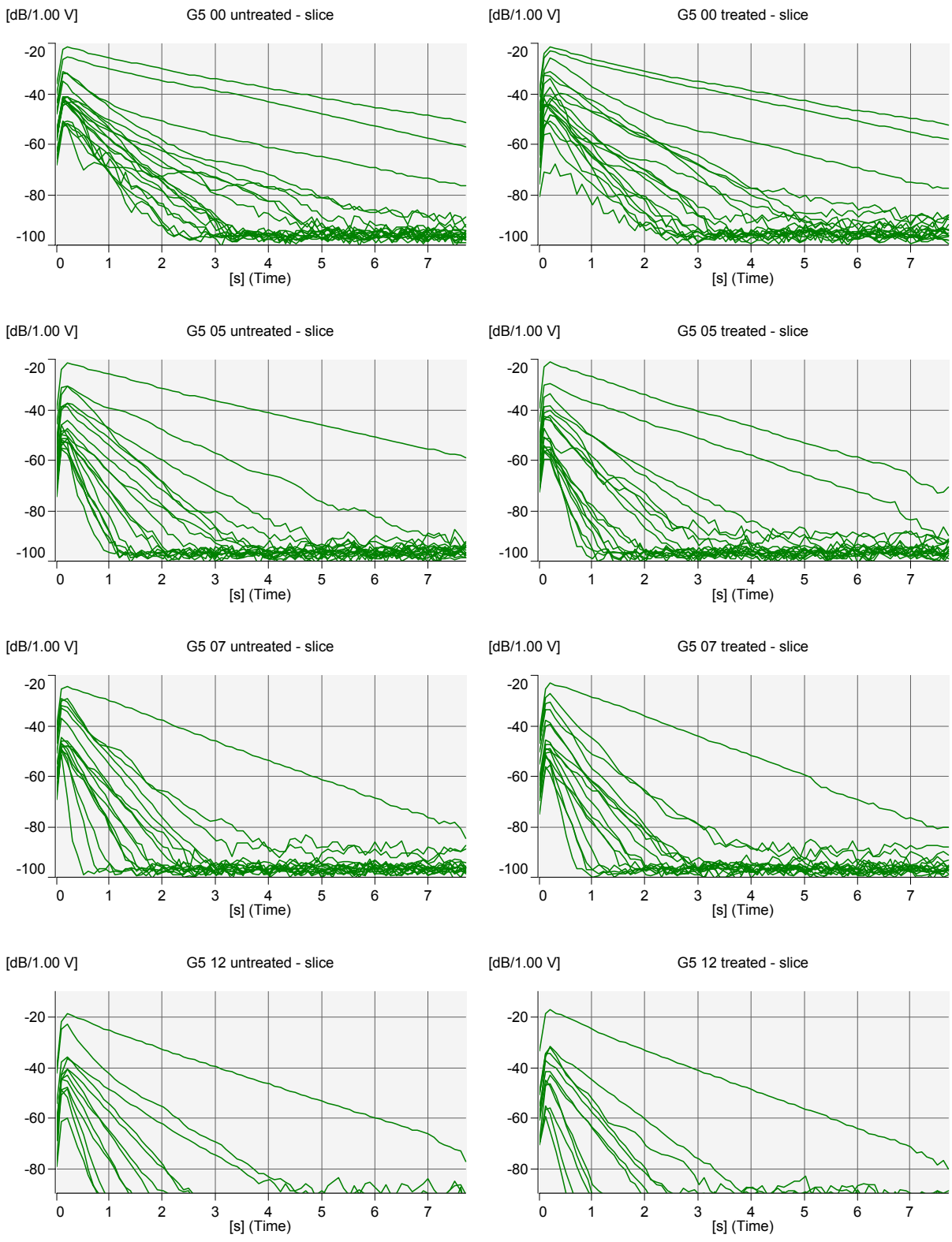


Figure C8-5 Partial decay slices of Taylor G5 00, 05, 07 and 12, first twenty partials.

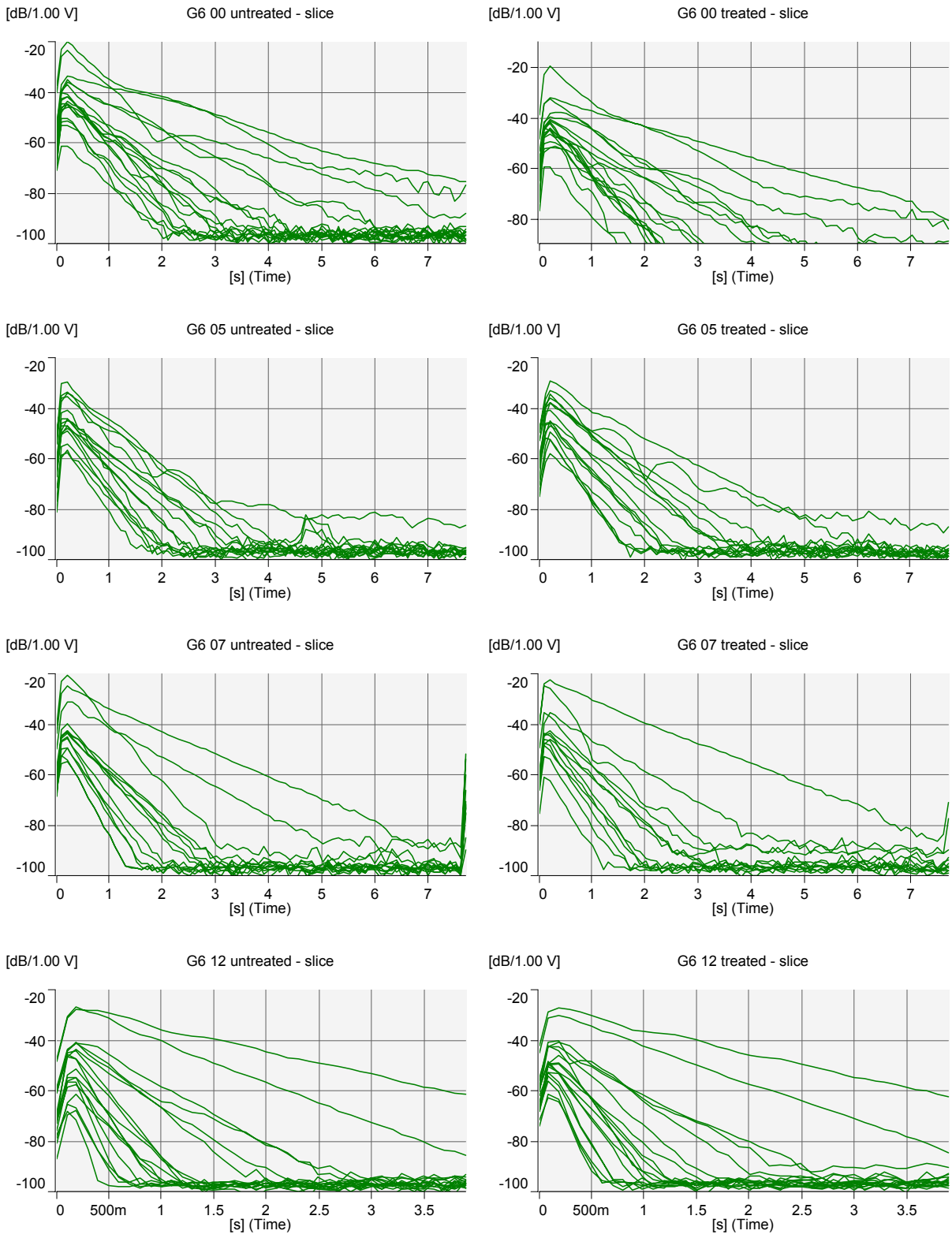
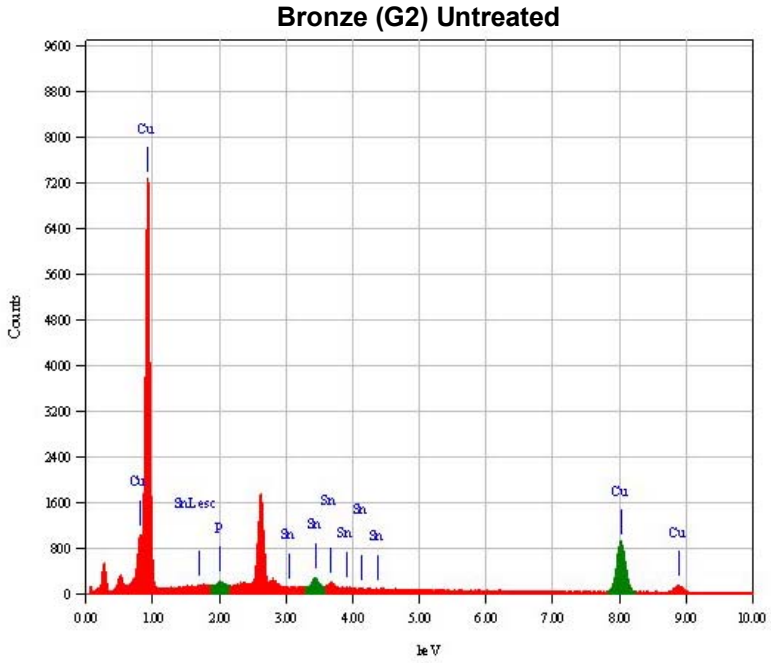
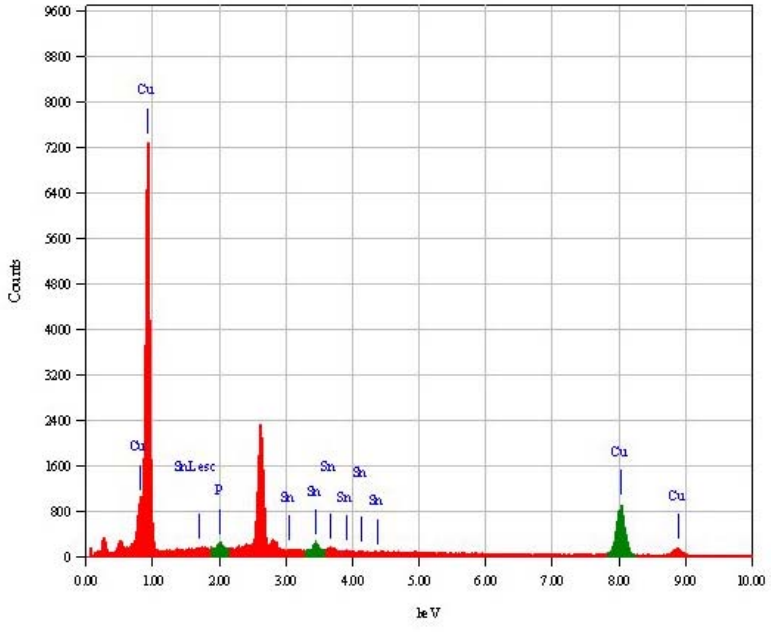


Figure C8-6 Partial decay slices of Taylor G6 00, 05, 07 and 12, first twenty partials.

C9 Energy Dispersion Spectrometry Results



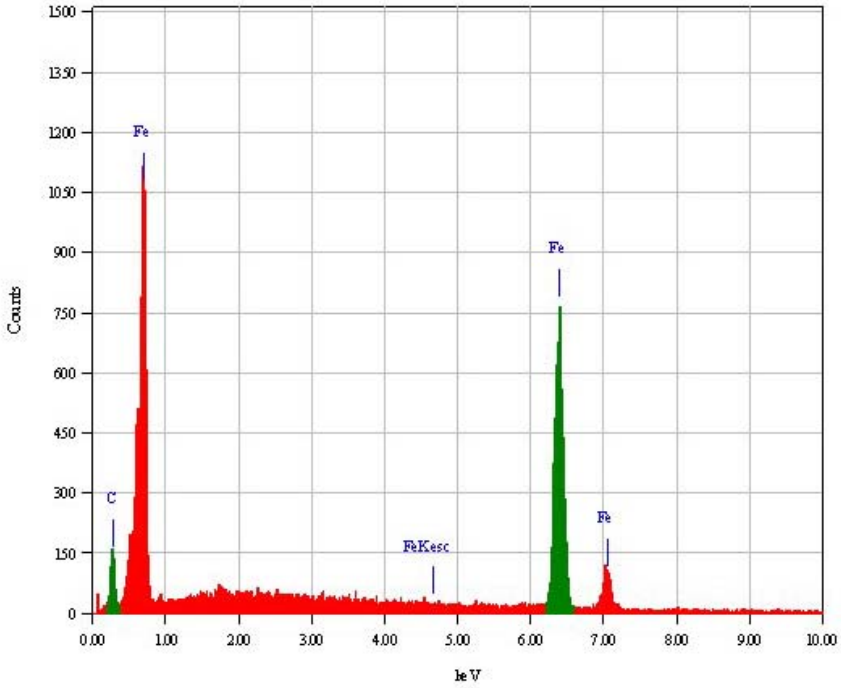
Element	(kev)	Mass%	Error%	At%	Cation
P K	2.013	0.94	0.49	1.96	0.7247
Cu K	8.040	92.41	3.55	94.40	93.6945
Sn L	3.442	6.65	1.35	3.64	5.5807
Total		100.00		100.00	



Element	(kev)	Mass%	Error%	At%	Cation
P K	2.013	1.53	0.66	3.18	1.1885
Cu K	8.040	93.13	4.76	93.94	94.3420
Sn L	3.442	5.34	1.81	2.88	4.4695
Total		100.00		100.00	

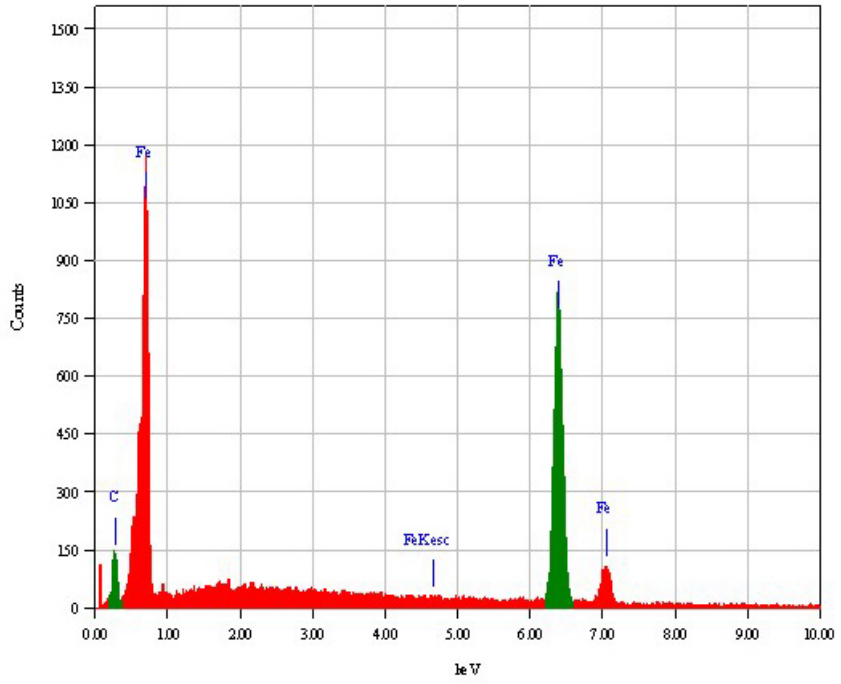
Figure C9-1 Energy Dispersion Spectrometry results for G2 Bronze, Untreated and Treated.

Steel (G2) Untreated



Element	(kev)	Mass%	Error%	At%	Cation
C K	0.277	18.74	0.13	51.74	6.2536
Fe K	6.395	81.26	0.44	48.26	93.7464
Total		100.00		100.00	

Steel (G2) Cryogenically Treated



Element	(kev)	Mass%	Error%	At%	Cation
C K	0.277	16.43	0.10	47.76	5.3146
Fe K	6.398	83.57	0.36	52.24	94.6854
Total		100.00		100.00	

Figure C9-2 Energy Dispersion Spectrometry results for G2 Steel, Untreated and Treated.

C10 Optical Micrographs, Steel

Steel- Longitudinal Sections, Optical Micrographs

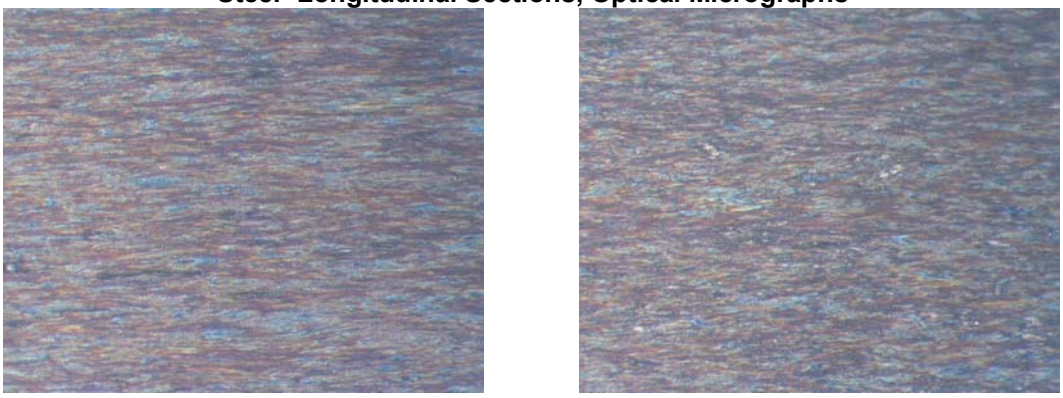


Figure C10-1 Steel longitudinal, **String G1** Untreated (left) and Treated (Right), 500×.

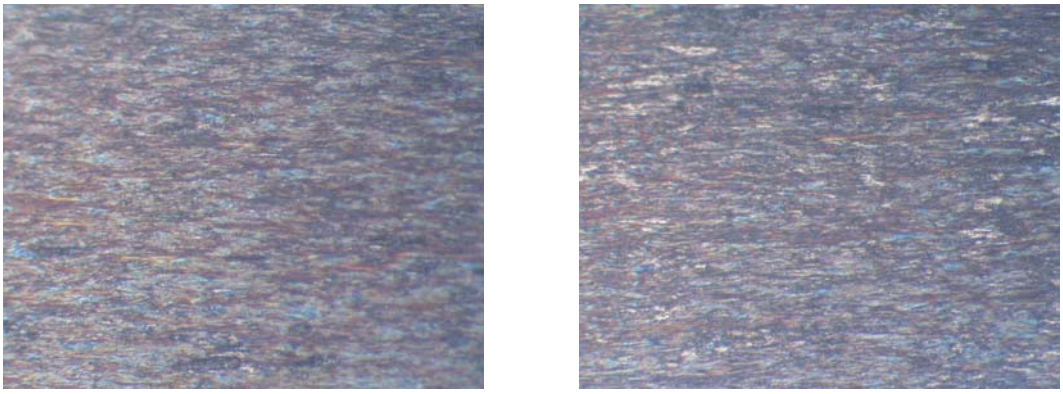


Figure C10-2 Steel longitudinal, **String G2** Untreated (left) and Treated (Right), 500×.

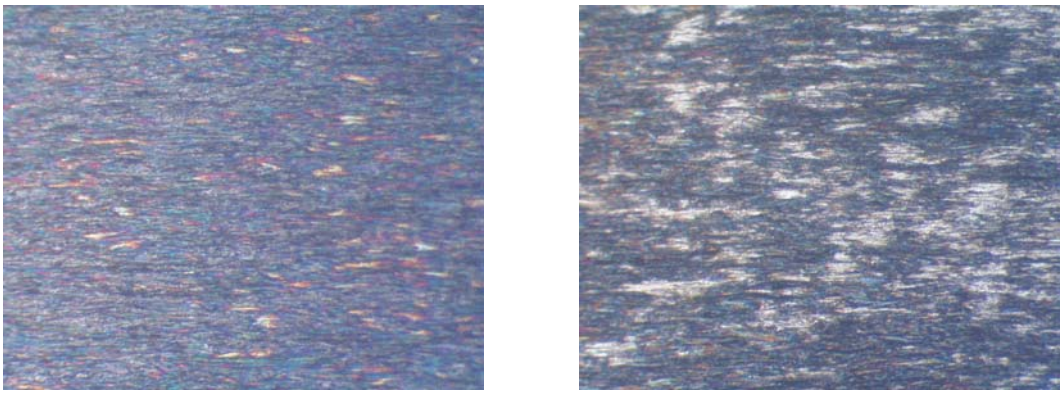


Figure C10-3 Steel longitudinal, **String G5** Untreated (left) and Treated (Right), 500×.

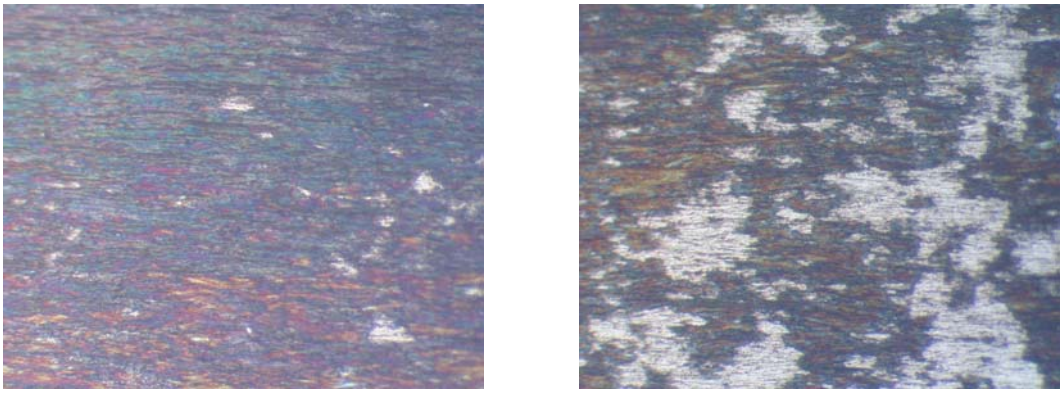


Figure C10-4 Steel longitudinal, **String G6** Untreated (left) and Treated (Right), 500×.

Steel- Transverse Sections, Optical Micrographs

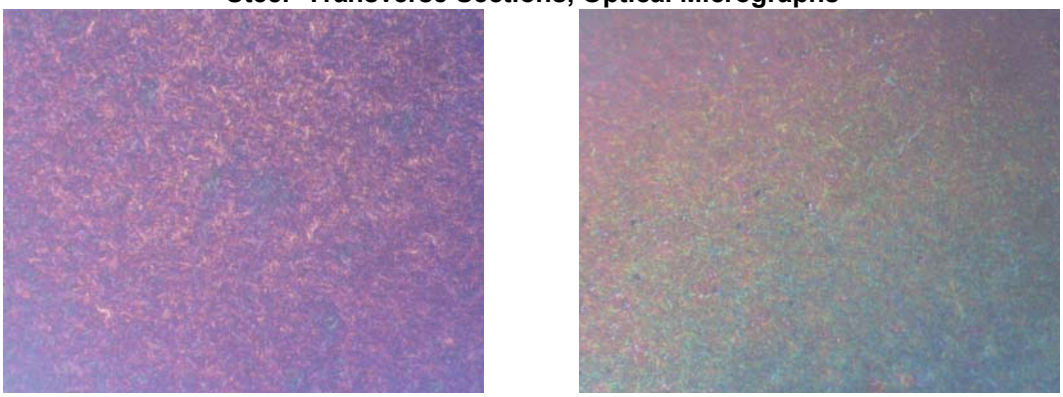


Figure C10-5 Steel transverse, **String G1** Untreated (left) and Treated (Right), 500×.

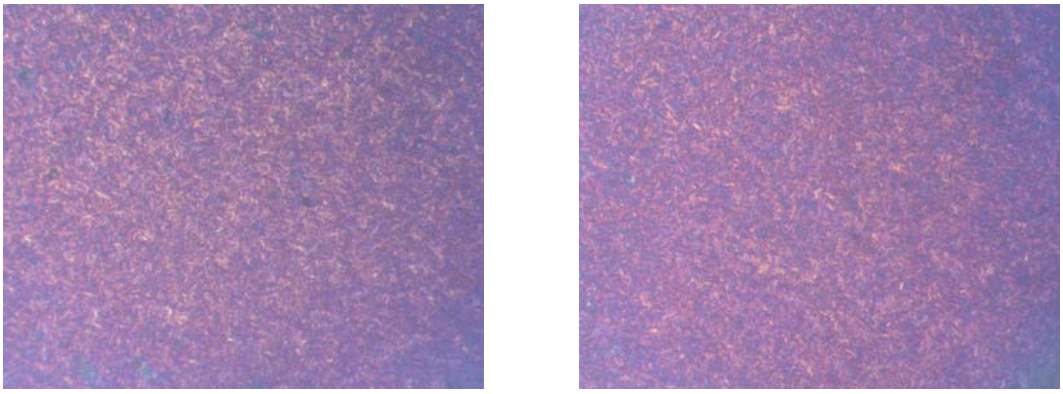


Figure C10-6 Steel transverse, **String G2** Untreated (left) and Treated (Right), 500×.

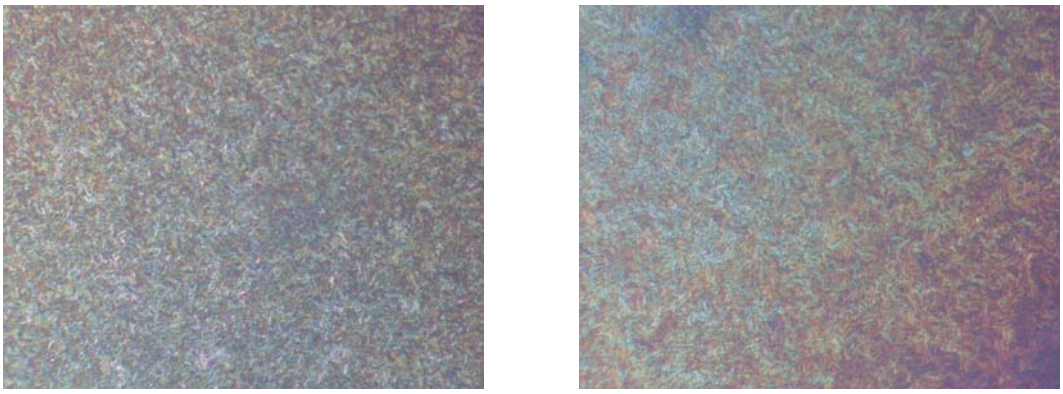


Figure C10-7 Steel transverse, **String G5** Untreated (left) and Treated (Right), 500×.

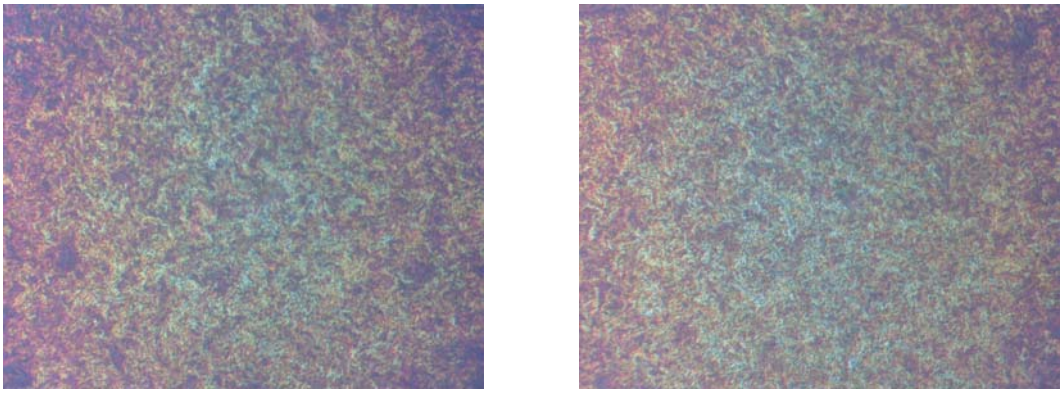


Figure C10-8 Steel transverse, **String G6** Untreated (left) and Treated (Right), 500×.

C11 Optical Micrographs, Bronze

Bronze- Transverse Sections, Optical Micrographs

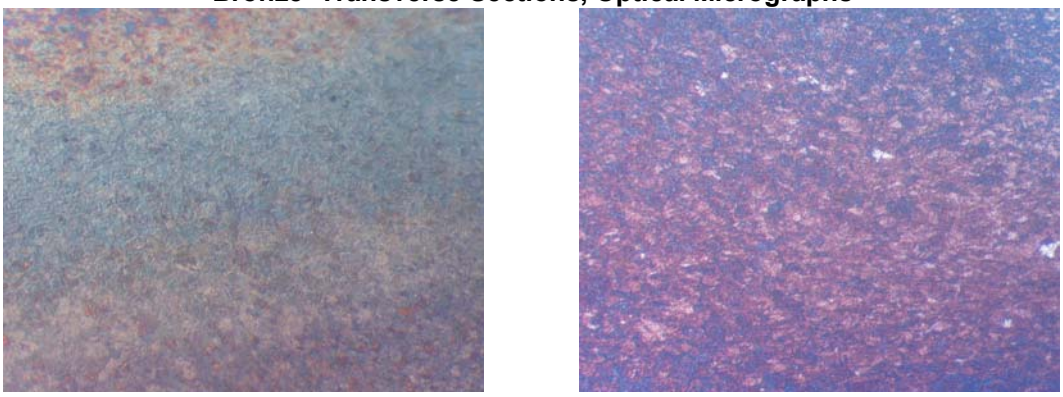


Figure C11-1 Bronze transverse, **String G1** Untreated (left) and Treated (Right), 500×.

Bronze- Longitudinal Sections, Optical Micrographs

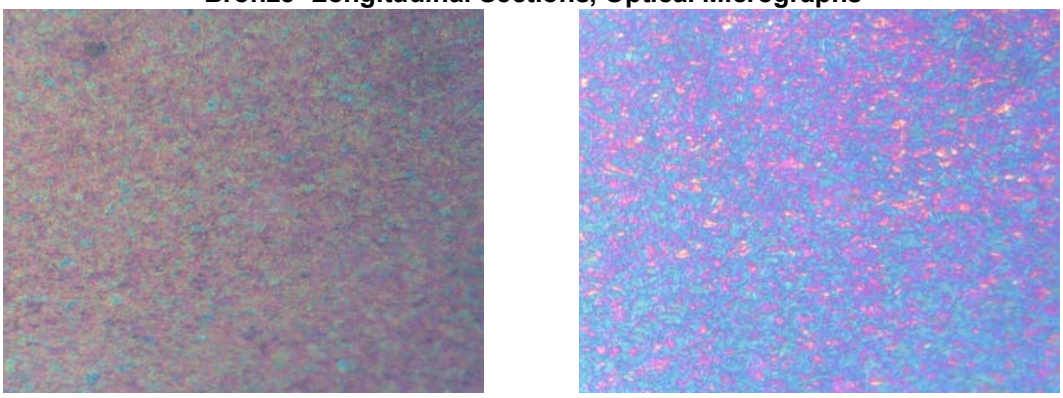


Figure C11-2 Bronze longitudinal, **String G1** Untreated (left) and Treated (Right), 500×.

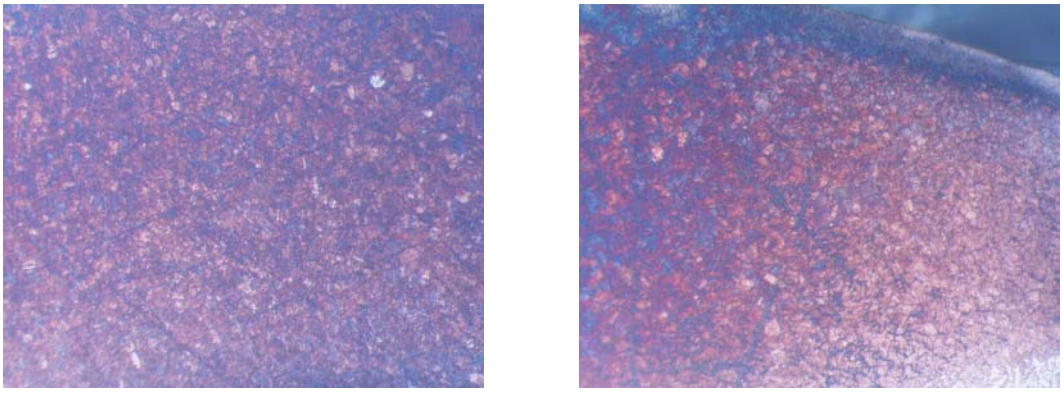


Figure C11-3 Bronze longitudinal, **String G2** Untreated (left) and Treated (Right), 500×.

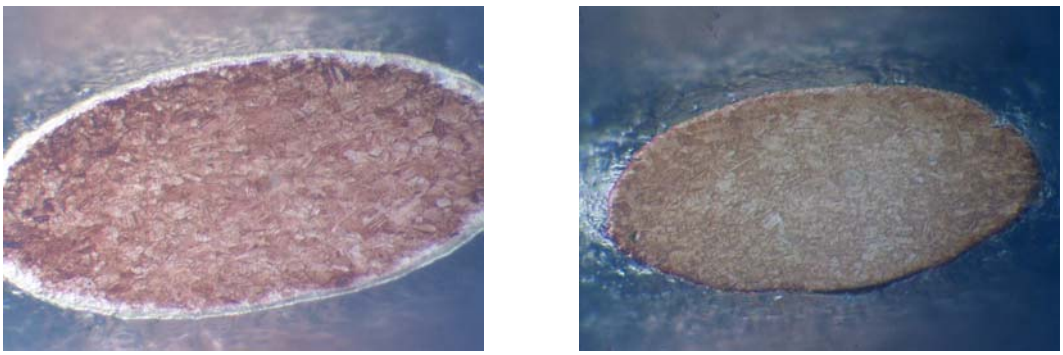


Figure C11-4 Bronze longitudinal, **String G4** Untreated (left) and Treated (Right), 500×.

C12 SEM Micrographs, Bronze and Steel

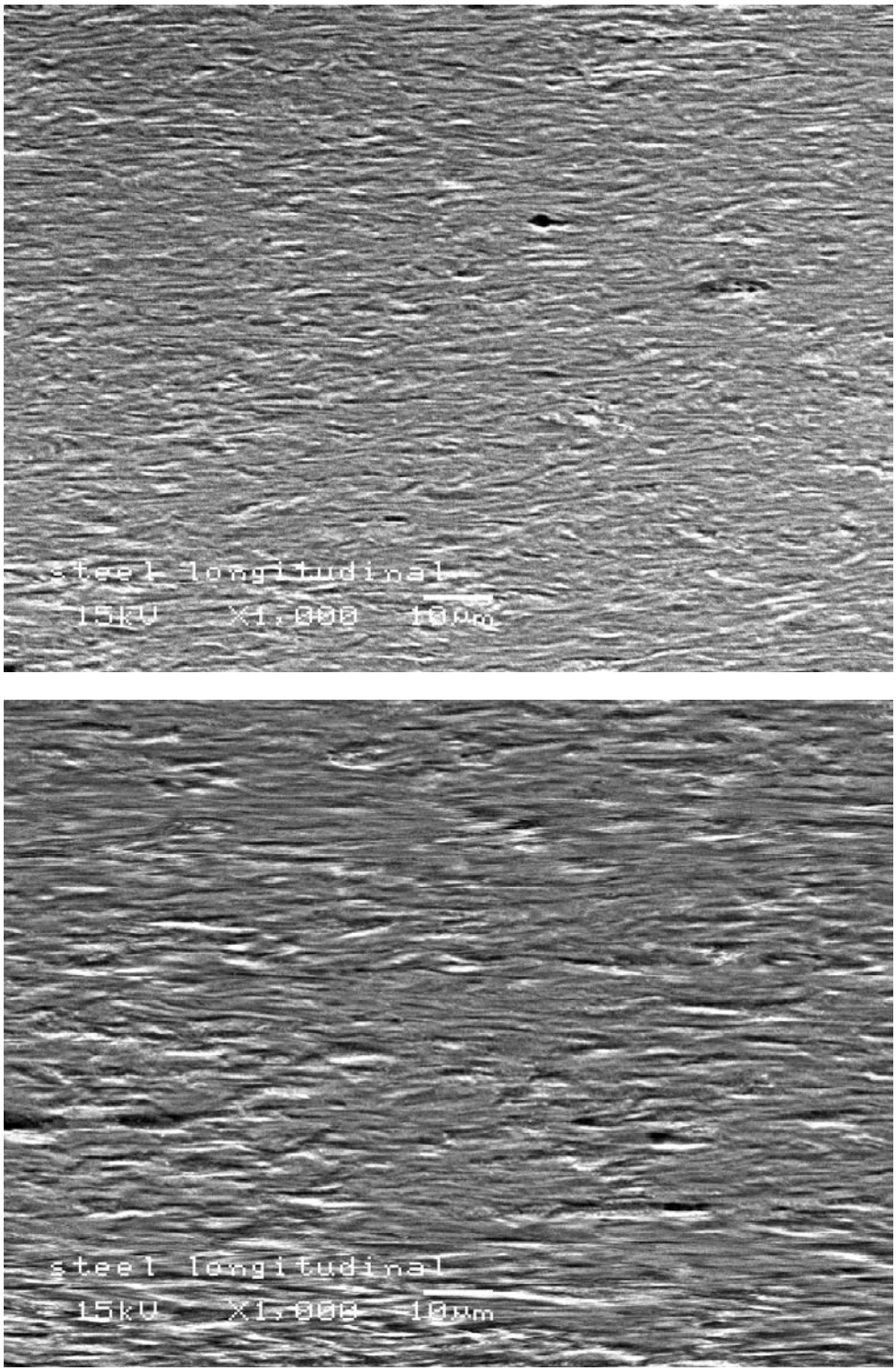


Figure C12-1 Steel longitudinal section after etching, **String G2** Untreated (top) and Treated (bottom), 1000×. Untreated sample showing some pitting and generally greater chemical attack.

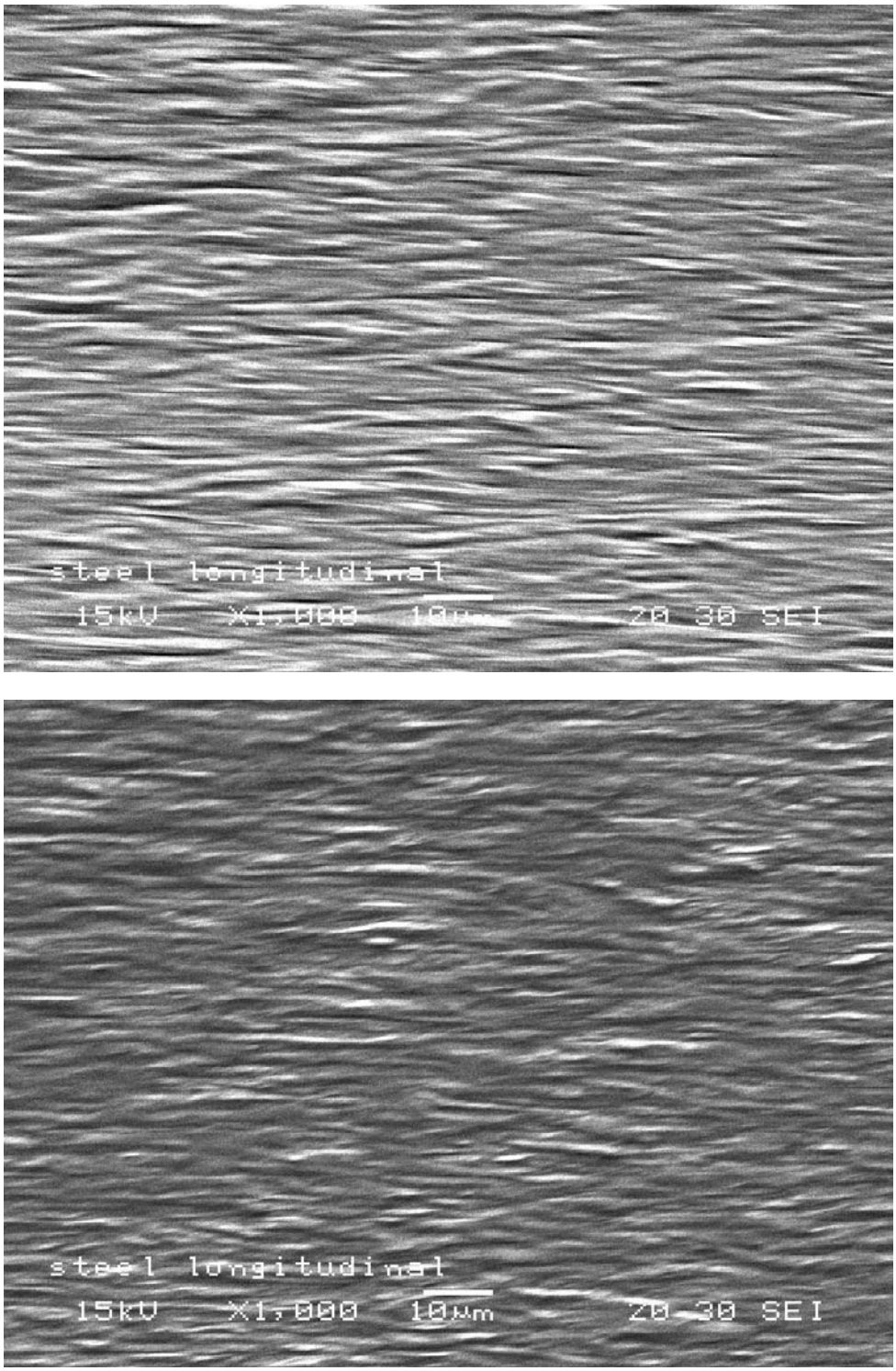


Figure C12-2 Steel longitudinal section after etching, **String G5** Untreated (top) and Treated (bottom), 1000×. Both samples showing strongly directional grain structure following closely to the wire axis (lef-right). Untreated sample again showing more pronounced chemical attack.

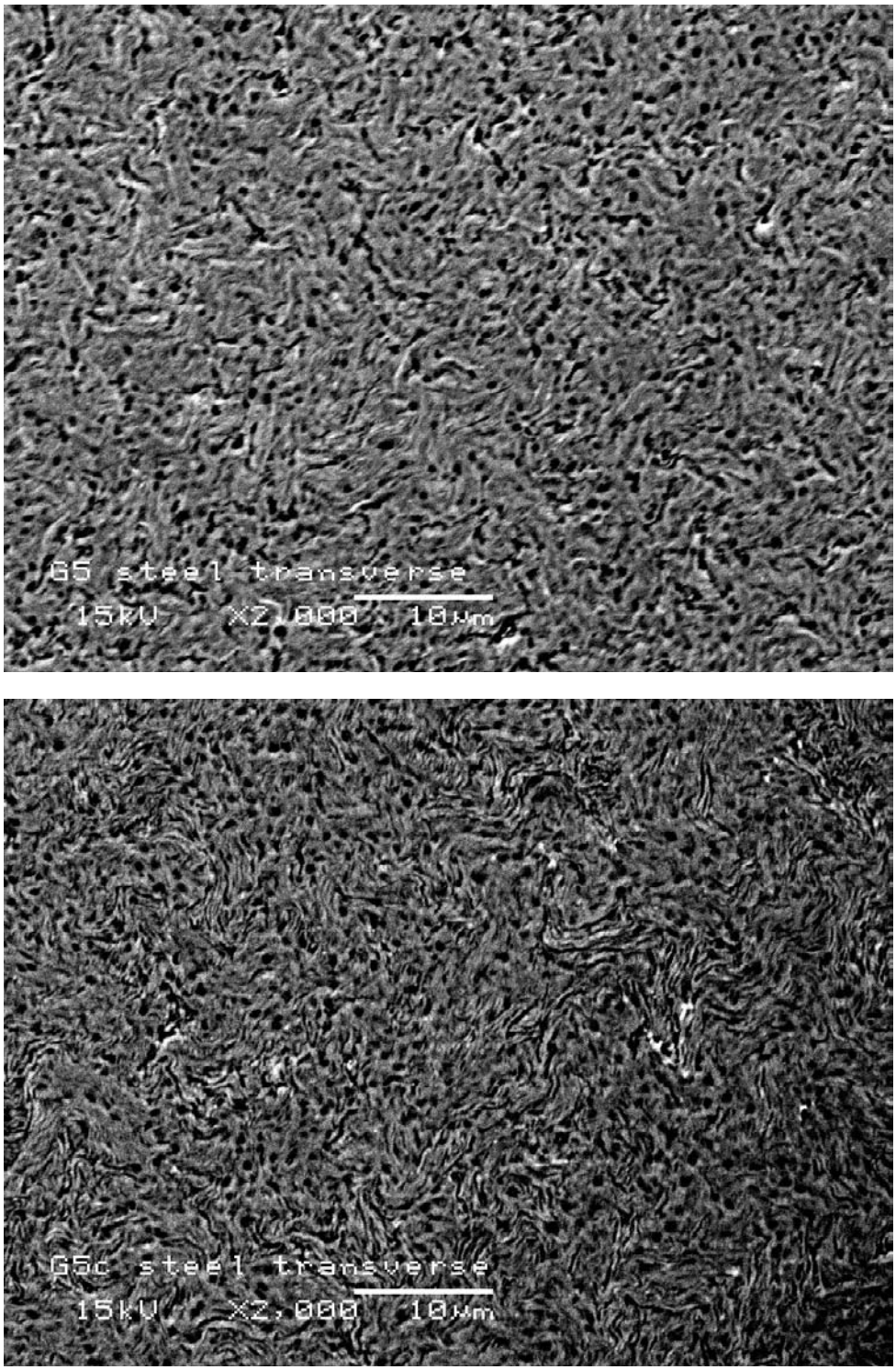


Figure C12-3 Steel transverse section after etching, **String G5** Untreated (top) and Treated (bottom), 2000×. Both samples showing fine lamella structure characteristic of pearlite. Treated sample shows a tighter lamellae structure.

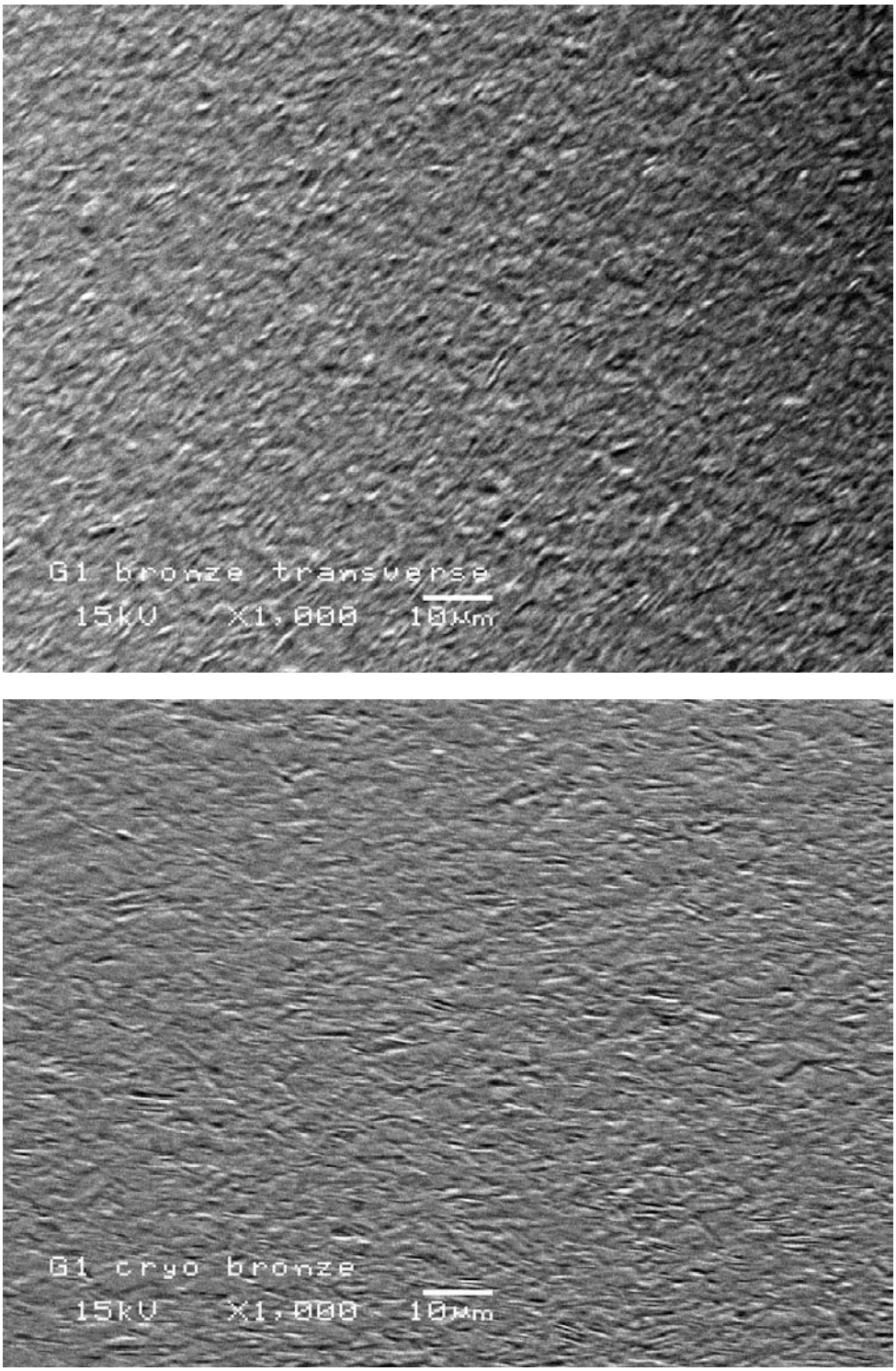


Figure C12-4 Bronze transverse section after etching, **String G1** Untreated (top) and Treated (bottom), 1000×. Untreated sample exhibits greater pitting from etching.

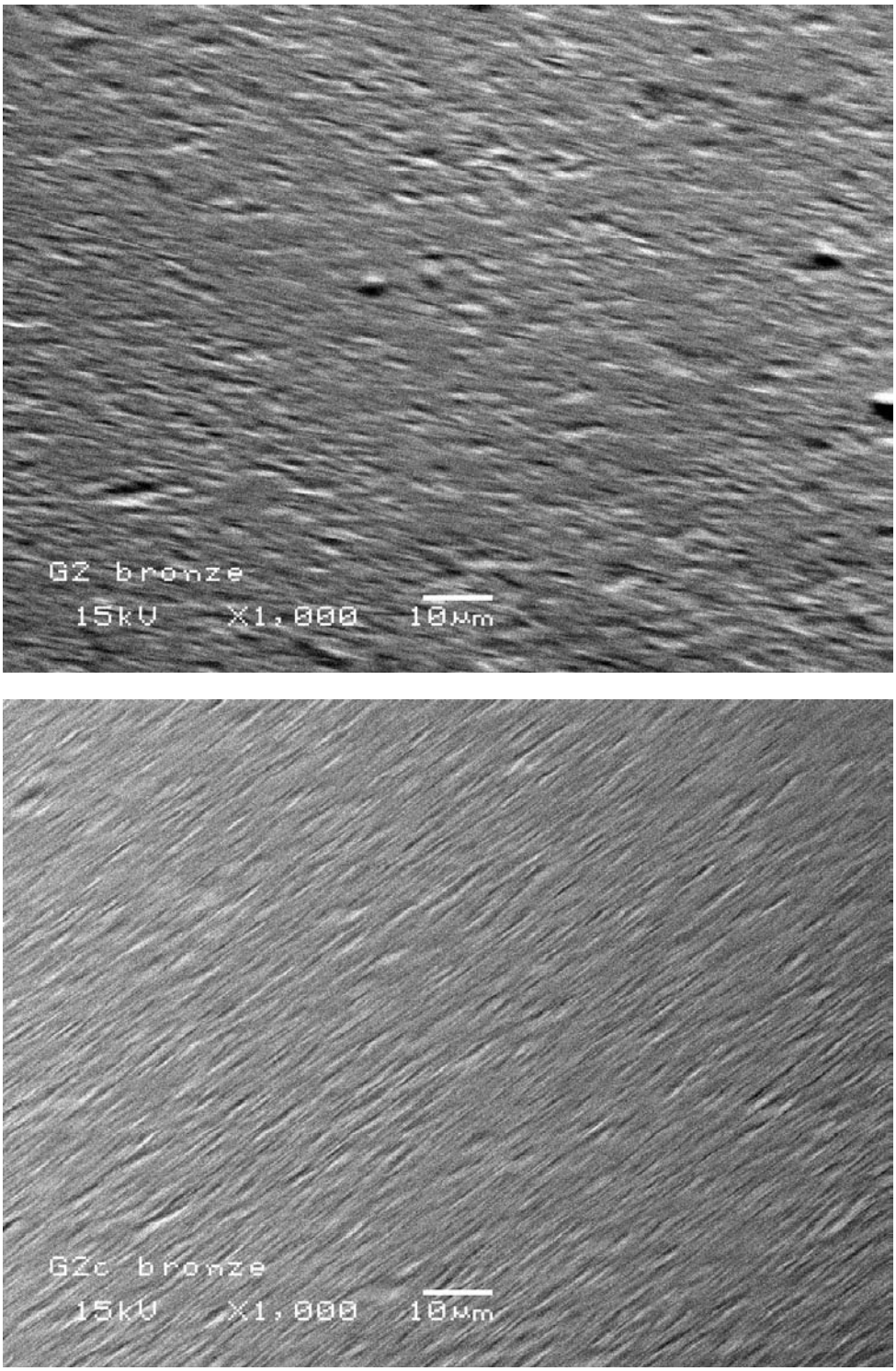


Figure C12-5 Bronze longitudinal section after etching, **String G2** Untreated (top) and Treated (bottom), 1000×. Untreated sample exhibits greater pitting from etching.