

Supplementary Material

Using Synchronous Fluorescence to Investigate Chemical Interactions Influencing Foam Characteristics in Sparkling Wines

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Table 1. Variable scores for each principal component related to three principal component analysis (λ_{em} 245 nm, λ_{em} 350 nm, λ_{em} 435 nm).

Variables	λ_{em} 245 nm			λ_{em} 350 nm			λ_{em} 435		
	PC1	PC2	PC3	PC1	PC2	PC3	PC1	PC2	PC3
V_f	0.08	0.91	0.10	-0.35	0.03	0.23	-0.34	0.11	0.86
h_c	0.05	0.13	-0.45	0.17	0.34	0.33	0.30	0.59	0.15
F_b	0.30	0.93	-0.14	-0.44	-0.07	0.44	-0.40	0.25	0.84
D_r	0.10	0.97	0.02	-0.54	-0.03	0.24	-0.47	0.26	0.82
L_f	-0.20	-0.80	0.07	0.37	0.07	-0.26	0.31	-0.25	-0.69
E	0.06	0.71	0.55	-0.22	0.01	0.16	-0.30	-0.16	0.75
h	0.23	-0.44	0.50	0.46	0.07	0.28	0.40	-0.03	-0.12
S_b	0.09	0.05	0.94	0.05	-0.30	-0.11	-0.02	-0.35	0.26
λ_{ex} 205	0.97	0.09	0.06	0.91	-0.32	-0.23	N/A	N/A	N/A
λ_{ex} 206	0.98	0.03	0.09	0.93	-0.28	-0.23	N/A	N/A	N/A
λ_{ex} 207	0.91	-0.16	0.18	0.93	-0.27	-0.24	N/A	N/A	N/A
λ_{ex} 208	0.96	-0.16	0.06	0.93	-0.26	-0.23	N/A	N/A	N/A
λ_{ex} 209	0.92	-0.19	0.10	0.95	-0.26	-0.16	N/A	N/A	N/A
λ_{ex} 210	0.99	-0.03	0.06	0.95	-0.22	-0.18	N/A	N/A	N/A
λ_{ex} 211	0.97	-0.16	-0.08	0.96	-0.20	-0.18	N/A	N/A	N/A
λ_{ex} 212	0.89	-0.11	-0.18	0.97	-0.17	-0.17	N/A	N/A	N/A
λ_{ex} 213	0.96	-0.24	0.01	0.97	-0.09	-0.17	N/A	N/A	N/A
λ_{ex} 214	0.94	0.10	-0.10	0.98	-0.04	-0.18	N/A	N/A	N/A
λ_{ex} 215	0.98	-0.10	0.05	0.99	-0.01	-0.08	N/A	N/A	N/A
λ_{ex} 216	0.98	-0.10	-0.03	0.98	0.07	-0.12	N/A	N/A	N/A
λ_{ex} 217	0.95	-0.06	-0.07	0.97	0.23	-0.08	N/A	N/A	N/A

λ_{ex} 218	0.95	0.07	-0.15	0.94	0.31	-0.01	N/A	N/A	N/A
λ_{ex} 219	0.97	0.00	-0.01	0.92	0.37	0.03	N/A	N/A	N/A
λ_{ex} 220	0.98	-0.06	-0.13	0.87	0.48	0.06	N/A	N/A	N/A
λ_{ex} 221	1.00	0.00	-0.01	0.80	0.57	0.08	N/A	N/A	N/A
λ_{ex} 222	0.98	-0.10	0.06	0.77	0.60	0.13	N/A	N/A	N/A
λ_{ex} 223	0.99	-0.08	-0.03	0.78	0.59	0.11	N/A	N/A	N/A
λ_{ex} 224	0.97	-0.06	0.00	0.78	0.61	0.06	N/A	N/A	N/A
λ_{ex} 225	0.99	0.00	-0.06	0.79	0.59	0.04	N/A	N/A	N/A
λ_{ex} 226	0.99	0.01	0.11	0.84	0.53	-0.03	N/A	N/A	N/A
λ_{ex} 227	0.99	0.00	0.00	0.88	0.45	-0.06	N/A	N/A	N/A
λ_{ex} 228	0.96	-0.13	0.09	0.91	0.40	-0.06	N/A	N/A	N/A
λ_{ex} 229	0.97	-0.14	-0.04	0.92	0.32	-0.14	N/A	N/A	N/A
λ_{ex} 230	0.99	0.00	0.04	0.93	0.31	-0.15	N/A	N/A	N/A
λ_{ex} 231	0.98	-0.06	0.06	0.96	0.18	-0.17	N/A	N/A	N/A
λ_{ex} 232	0.99	-0.03	-0.01	0.97	0.05	-0.21	N/A	N/A	N/A
λ_{ex} 233	0.99	0.05	-0.01	0.96	-0.11	-0.26	N/A	N/A	N/A
λ_{ex} 234	1.00	0.04	-0.03	0.95	-0.17	-0.26	N/A	N/A	N/A
λ_{ex} 235	0.99	0.06	-0.02	0.93	-0.23	-0.29	N/A	N/A	N/A
λ_{ex} 236	1.00	0.01	-0.01	0.93	-0.24	-0.28	N/A	N/A	N/A
λ_{ex} 237	0.99	0.04	-0.01	0.92	-0.26	-0.28	N/A	N/A	N/A
λ_{ex} 238	0.99	0.01	0.01	0.92	-0.27	-0.28	N/A	N/A	N/A
λ_{ex} 239	0.99	-0.05	0.02	0.92	-0.28	-0.27	N/A	N/A	N/A
λ_{ex} 240	0.92	0.25	-0.06	0.92	-0.27	-0.28	N/A	N/A	N/A
λ_{ex} 241	0.94	0.19	-0.08	0.92	-0.27	-0.28	N/A	N/A	N/A
λ_{ex} 242	0.94	0.16	-0.04	0.92	-0.26	-0.27	N/A	N/A	N/A
λ_{ex} 243	0.95	0.20	-0.03	0.92	-0.26	-0.28	N/A	N/A	N/A
λ_{ex} 244	0.97	0.12	0.00	0.93	-0.26	-0.27	N/A	N/A	N/A
λ_{ex} 245	N/A	N/A	N/A	0.93	-0.23	-0.26	N/A	N/A	N/A
λ_{ex} 246	N/A	N/A	N/A	0.94	-0.23	-0.25	N/A	N/A	N/A
λ_{ex} 247	N/A	N/A	N/A	0.95	-0.18	-0.25	N/A	N/A	N/A
λ_{ex} 248	N/A	N/A	N/A	0.95	-0.16	-0.25	0.95	-0.28	0.04
λ_{ex} 249	N/A	N/A	N/A	0.96	-0.13	-0.22	0.95	-0.29	0.03
λ_{ex} 250	N/A	N/A	N/A	0.97	-0.09	-0.23	0.96	-0.27	0.03
λ_{ex} 251	N/A	N/A	N/A	0.97	-0.08	-0.22	0.94	-0.31	0.03
λ_{ex} 252	N/A	N/A	N/A	0.98	-0.04	-0.17	0.94	-0.30	-0.01
λ_{ex} 253	N/A	N/A	N/A	0.98	0.01	-0.16	0.92	-0.37	0.01
λ_{ex} 254	N/A	N/A	N/A	0.98	0.09	-0.15	0.92	-0.36	0.02
λ_{ex} 255	N/A	N/A	N/A	0.98	0.14	-0.12	0.92	-0.39	0.02
λ_{ex} 256	N/A	N/A	N/A	0.97	0.19	-0.10	0.92	-0.37	0.01
λ_{ex} 257	N/A	N/A	N/A	0.95	0.30	-0.07	0.92	-0.39	0.01
λ_{ex} 258	N/A	N/A	N/A	0.93	0.36	-0.05	0.91	-0.40	0.03
λ_{ex} 259	N/A	N/A	N/A	0.89	0.43	0.04	0.91	-0.41	0.02
λ_{ex} 260	N/A	N/A	N/A	0.87	0.48	0.00	0.91	-0.41	0.01
λ_{ex} 261	N/A	N/A	N/A	0.84	0.53	0.06	0.91	-0.40	0.02
λ_{ex} 262	N/A	N/A	N/A	0.81	0.57	0.10	0.91	-0.40	0.04
λ_{ex} 263	N/A	N/A	N/A	0.80	0.58	0.11	0.89	-0.44	0.01
λ_{ex} 264	N/A	N/A	N/A	0.78	0.61	0.12	0.89	-0.46	0.03

λ_{ex} 265	N/A	N/A	N/A	0.74	0.65	0.14	0.90	-0.43	0.01
λ_{ex} 266	N/A	N/A	N/A	0.70	0.68	0.17	0.89	-0.46	0.00
λ_{ex} 267	N/A	N/A	N/A	0.69	0.68	0.22	0.88	-0.47	0.02
λ_{ex} 268	N/A	N/A	N/A	0.69	0.68	0.26	0.88	-0.48	0.03
λ_{ex} 269	N/A	N/A	N/A	0.68	0.67	0.29	0.88	-0.47	0.00
λ_{ex} 270	N/A	N/A	N/A	0.66	0.65	0.35	0.88	-0.47	0.02
λ_{ex} 271	N/A	N/A	N/A	0.67	0.66	0.35	0.88	-0.46	0.03
λ_{ex} 272	N/A	N/A	N/A	0.67	0.66	0.33	0.89	-0.46	0.02
λ_{ex} 273	N/A	N/A	N/A	0.66	0.65	0.36	0.87	-0.48	0.04
λ_{ex} 274	N/A	N/A	N/A	0.67	0.66	0.35	0.88	-0.47	0.04
λ_{ex} 275	N/A	N/A	N/A	0.66	0.65	0.36	0.87	-0.49	0.01
λ_{ex} 276	N/A	N/A	N/A	0.67	0.65	0.35	0.88	-0.48	0.02
λ_{ex} 277	N/A	N/A	N/A	0.67	0.65	0.35	0.88	-0.46	0.04
λ_{ex} 278	N/A	N/A	N/A	0.66	0.65	0.37	0.88	-0.46	0.02
λ_{ex} 279	N/A	N/A	N/A	0.67	0.66	0.33	0.88	-0.47	0.02
λ_{ex} 280	N/A	N/A	N/A	0.67	0.66	0.33	0.89	-0.46	0.01
λ_{ex} 281	N/A	N/A	N/A	0.67	0.66	0.34	0.88	-0.48	0.02
λ_{ex} 282	N/A	N/A	N/A	0.67	0.66	0.32	0.89	-0.46	0.02
λ_{ex} 283	N/A	N/A	N/A	0.68	0.66	0.32	0.89	-0.45	0.02
λ_{ex} 284	N/A	N/A	N/A	0.68	0.67	0.29	0.88	-0.47	0.02
λ_{ex} 285	N/A	N/A	N/A	0.69	0.68	0.24	0.89	-0.46	0.04
λ_{ex} 286	N/A	N/A	N/A	0.69	0.68	0.23	0.89	-0.45	0.00
λ_{ex} 287	N/A	N/A	N/A	0.71	0.68	0.16	0.90	-0.43	0.00
λ_{ex} 288	N/A	N/A	N/A	0.74	0.66	0.13	0.90	-0.43	0.05
λ_{ex} 289	N/A	N/A	N/A	0.80	0.58	0.10	0.89	-0.45	0.03
λ_{ex} 290	N/A	N/A	N/A	0.88	0.46	0.01	0.89	-0.45	0.02
λ_{ex} 291	N/A	N/A	N/A	0.95	0.30	-0.06	0.89	-0.45	0.02
λ_{ex} 292	N/A	N/A	N/A	0.98	0.15	-0.12	0.91	-0.42	0.01
λ_{ex} 293	N/A	N/A	N/A	0.98	0.01	-0.16	0.88	-0.46	0.05
λ_{ex} 294	N/A	N/A	N/A	0.97	-0.09	-0.18	0.90	-0.43	0.01
λ_{ex} 295	N/A	N/A	N/A	0.96	-0.17	-0.21	0.91	-0.40	0.05
λ_{ex} 296	N/A	N/A	N/A	0.94	-0.20	-0.23	0.90	-0.43	0.03
λ_{ex} 297	N/A	N/A	N/A	0.93	-0.24	-0.24	0.91	-0.39	0.03
λ_{ex} 298	N/A	N/A	N/A	0.93	-0.24	-0.24	0.90	-0.42	0.02
λ_{ex} 299	N/A	N/A	N/A	0.93	-0.24	-0.23	0.91	-0.40	0.03
λ_{ex} 300	N/A	N/A	N/A	0.93	-0.24	-0.24	0.93	-0.36	0.03
λ_{ex} 301	N/A	N/A	N/A	0.94	-0.24	-0.23	0.92	-0.36	0.04
λ_{ex} 302	N/A	N/A	N/A	0.94	-0.23	-0.23	0.93	-0.33	0.00
λ_{ex} 303	N/A	N/A	N/A	0.95	-0.20	-0.22	0.92	-0.31	0.05
λ_{ex} 304	N/A	N/A	N/A	0.95	-0.22	-0.20	0.93	-0.29	0.05
λ_{ex} 305	N/A	N/A	N/A	0.95	-0.20	-0.22	0.93	-0.24	0.05
λ_{ex} 306	N/A	N/A	N/A	0.96	-0.20	-0.20	0.94	-0.25	0.05
λ_{ex} 307	N/A	N/A	N/A	0.96	-0.18	-0.20	0.94	-0.18	-0.02
λ_{ex} 308	N/A	N/A	N/A	0.96	-0.20	-0.17	0.94	-0.23	0.01
λ_{ex} 309	N/A	N/A	N/A	0.97	-0.17	-0.15	0.95	-0.24	0.00
λ_{ex} 310	N/A	N/A	N/A	0.97	-0.19	-0.12	0.95	-0.15	0.04
λ_{ex} 311	N/A	N/A	N/A	0.96	-0.15	-0.14	0.96	-0.19	0.00

λ_{ex} 312	N/A	N/A	N/A	0.95	-0.17	-0.09	0.97	-0.18	0.00
λ_{ex} 313	N/A	N/A	N/A	0.97	-0.17	-0.06	0.98	-0.09	-0.02
λ_{ex} 314	N/A	N/A	N/A	0.93	-0.23	-0.02	0.97	-0.17	-0.01
λ_{ex} 315	N/A	N/A	N/A	0.94	-0.22	0.00	0.97	-0.07	0.00
λ_{ex} 316	N/A	N/A	N/A	0.94	-0.25	0.10	0.98	-0.10	0.00
λ_{ex} 317	N/A	N/A	N/A	0.92	-0.32	0.07	0.98	0.01	0.00
λ_{ex} 318	N/A	N/A	N/A	0.89	-0.34	0.04	0.98	-0.01	0.01
λ_{ex} 319	N/A	N/A	N/A	0.86	-0.43	0.10	0.98	0.08	-0.02
λ_{ex} 320	N/A	N/A	N/A	0.88	-0.46	0.04	0.98	0.09	0.05
λ_{ex} 321	N/A	N/A	N/A	0.92	-0.38	0.04	0.97	0.11	-0.06
λ_{ex} 322	N/A	N/A	N/A	0.88	-0.44	0.02	0.95	0.25	-0.03
λ_{ex} 323	N/A	N/A	N/A	0.89	-0.42	0.13	0.93	0.31	0.00
λ_{ex} 324	N/A	N/A	N/A	0.84	-0.46	0.20	0.94	0.29	-0.06
λ_{ex} 325	N/A	N/A	N/A	0.83	-0.52	0.15	0.90	0.41	-0.08
λ_{ex} 326	N/A	N/A	N/A	0.80	-0.57	0.16	0.88	0.42	-0.11
λ_{ex} 327	N/A	N/A	N/A	0.80	-0.55	0.19	0.88	0.41	-0.15
λ_{ex} 328	N/A	N/A	N/A	0.78	-0.55	0.28	0.59	0.60	0.02
λ_{ex} 329	N/A	N/A	N/A	0.78	-0.53	0.29	0.72	0.61	0.11
λ_{ex} 330	N/A	N/A	N/A	0.73	-0.55	0.37	0.66	0.59	0.10
λ_{ex} 331	N/A	N/A	N/A	0.74	-0.58	0.33	0.60	0.73	0.01
λ_{ex} 332	N/A	N/A	N/A	0.77	-0.52	0.36	0.66	0.73	-0.01
λ_{ex} 333	N/A	N/A	N/A	0.68	-0.60	0.42	0.67	0.71	0.09
λ_{ex} 334	N/A	N/A	N/A	0.69	-0.61	0.37	0.74	0.65	0.12
λ_{ex} 335	N/A	N/A	N/A	0.67	-0.58	0.45	0.70	0.67	0.12
λ_{ex} 336	N/A	N/A	N/A	0.67	-0.58	0.45	0.70	0.67	0.14
λ_{ex} 337	N/A	N/A	N/A	0.62	-0.60	0.49	0.59	0.80	0.00
λ_{ex} 338	N/A	N/A	N/A	0.63	-0.56	0.53	0.66	0.72	0.05
λ_{ex} 339	N/A	N/A	N/A	0.59	-0.60	0.52	0.61	0.76	-0.03
λ_{ex} 340	N/A	N/A	N/A	0.56	-0.60	0.56	0.64	0.76	-0.02
λ_{ex} 341	N/A	N/A	N/A	0.56	-0.59	0.57	0.73	0.64	-0.01
λ_{ex} 342	N/A	N/A	N/A	0.53	-0.62	0.58	0.78	0.60	0.00
λ_{ex} 343	N/A	N/A	N/A	0.49	-0.59	0.63	0.77	0.61	-0.05
λ_{ex} 344	N/A	N/A	N/A	0.51	-0.62	0.58	0.80	0.59	-0.02
λ_{ex} 345	N/A	N/A	N/A	0.42	-0.6	0.66	0.83	0.53	-0.04
λ_{ex} 346	N/A	N/A	N/A	0.35	-0.58	0.71	0.76	0.60	-0.03
λ_{ex} 347	N/A	N/A	N/A	0.38	-0.57	0.71	0.79	0.56	0.03
λ_{ex} 348	N/A	N/A	N/A	0.30	-0.58	0.73	0.71	0.69	-0.05
λ_{ex} 349	N/A	N/A	N/A	0.26	-0.55	0.78	0.80	0.56	-0.07
λ_{ex} 350	N/A	N/A	N/A	0.99	0.68	0.78	0.75	0.64	-0.10
λ_{ex} 351	N/A	N/A	N/A	N/A	N/A	N/A	0.81	0.54	0.01
λ_{ex} 352	N/A	N/A	N/A	N/A	N/A	N/A	0.79	0.56	-0.05
λ_{ex} 353	N/A	N/A	N/A	N/A	N/A	N/A	0.76	0.61	0.05
λ_{ex} 354	N/A	N/A	N/A	N/A	N/A	N/A	0.87	0.47	-0.09
λ_{ex} 355	N/A	N/A	N/A	N/A	N/A	N/A	0.81	0.57	-0.04
λ_{ex} 356	N/A	N/A	N/A	N/A	N/A	N/A	0.88	0.46	-0.01
λ_{ex} 357	N/A	N/A	N/A	N/A	N/A	N/A	0.87	0.47	-0.02
λ_{ex} 358	N/A	N/A	N/A	N/A	N/A	N/A	0.79	0.57	-0.02

λ_{ex} 359	N/A	N/A	N/A	N/A	N/A	N/A	0.81	0.51	-0.09
λ_{ex} 360	N/A	N/A	N/A	N/A	N/A	N/A	0.86	0.50	0.05
λ_{ex} 361	N/A	N/A	N/A	N/A	N/A	N/A	0.95	0.30	0.00
λ_{ex} 362	N/A	N/A	N/A	N/A	N/A	N/A	0.94	0.31	-0.02
λ_{ex} 363	N/A	N/A	N/A	N/A	N/A	N/A	0.87	0.46	-0.02
λ_{ex} 364	N/A	N/A	N/A	N/A	N/A	N/A	0.91	0.35	-0.15
λ_{ex} 365	N/A	N/A	N/A	N/A	N/A	N/A	0.92	0.30	-0.03
λ_{ex} 366	N/A	N/A	N/A	N/A	N/A	N/A	0.87	0.45	-0.03
λ_{ex} 367	N/A	N/A	N/A	N/A	N/A	N/A	0.92	0.31	-0.09
λ_{ex} 368	N/A	N/A	N/A	N/A	N/A	N/A	0.94	0.33	0.01
λ_{ex} 369	N/A	N/A	N/A	N/A	N/A	N/A	0.89	0.39	-0.09
λ_{ex} 370	N/A	N/A	N/A	N/A	N/A	N/A	0.88	0.42	0.04
λ_{ex} 371	N/A	N/A	N/A	N/A	N/A	N/A	0.95	0.26	0.00
λ_{ex} 372	N/A	N/A	N/A	N/A	N/A	N/A	0.94	0.27	-0.02
λ_{ex} 373	N/A	N/A	N/A	N/A	N/A	N/A	0.96	0.25	0.02
λ_{ex} 374	N/A	N/A	N/A	N/A	N/A	N/A	0.91	0.36	0.06
λ_{ex} 375	N/A	N/A	N/A	N/A	N/A	N/A	0.94	0.28	0.10
λ_{ex} 376	N/A	N/A	N/A	N/A	N/A	N/A	0.92	0.28	0.02
λ_{ex} 377	N/A	N/A	N/A	N/A	N/A	N/A	0.95	0.18	0.04
λ_{ex} 378	N/A	N/A	N/A	N/A	N/A	N/A	0.92	0.30	0.15
λ_{ex} 379	N/A	N/A	N/A	N/A	N/A	N/A	0.95	0.26	0.03
λ_{ex} 380	N/A	N/A	N/A	N/A	N/A	N/A	0.98	0.12	-0.01
λ_{ex} 381	N/A	N/A	N/A	N/A	N/A	N/A	0.98	0.12	0.06
λ_{ex} 382	N/A	N/A	N/A	N/A	N/A	N/A	0.97	0.14	0.09
λ_{ex} 383	N/A	N/A	N/A	N/A	N/A	N/A	0.98	0.08	0.08
λ_{ex} 384	N/A	N/A	N/A	N/A	N/A	N/A	0.98	0.02	0.07
λ_{ex} 385	N/A	N/A	N/A	N/A	N/A	N/A	0.98	0.06	0.09
λ_{ex} 386	N/A	N/A	N/A	N/A	N/A	N/A	0.97	0.12	0.03
λ_{ex} 387	N/A	N/A	N/A	N/A	N/A	N/A	0.97	0.09	0.01
λ_{ex} 388	N/A	N/A	N/A	N/A	N/A	N/A	0.92	0.12	-0.01
λ_{ex} 389	N/A	N/A	N/A	N/A	N/A	N/A	0.95	0.03	-0.03
λ_{ex} 390	N/A	N/A	N/A	N/A	N/A	N/A	0.96	0.03	0.09
λ_{ex} 391	N/A	N/A	N/A	N/A	N/A	N/A	0.96	0.02	0.02
λ_{ex} 392	N/A	N/A	N/A	N/A	N/A	N/A	0.96	-0.05	0.02
<i>Data explanation (%)</i>	78.8	9.4	3.9	68.0	18.8	7.9	75.1	17.5	2.4



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