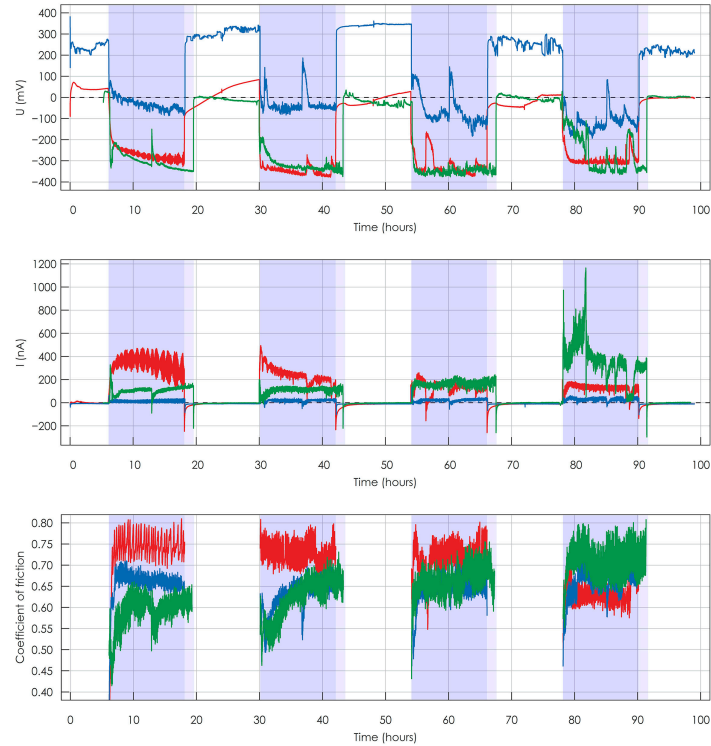
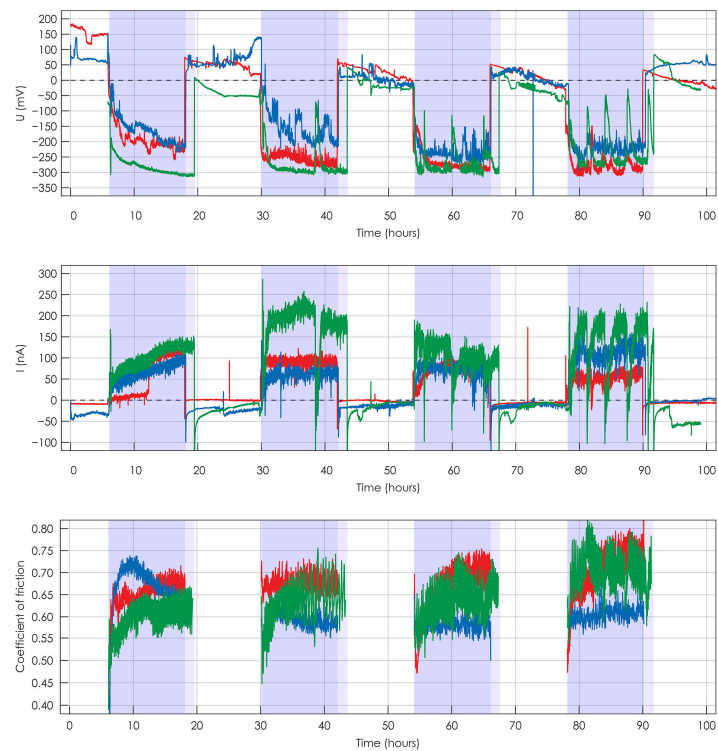


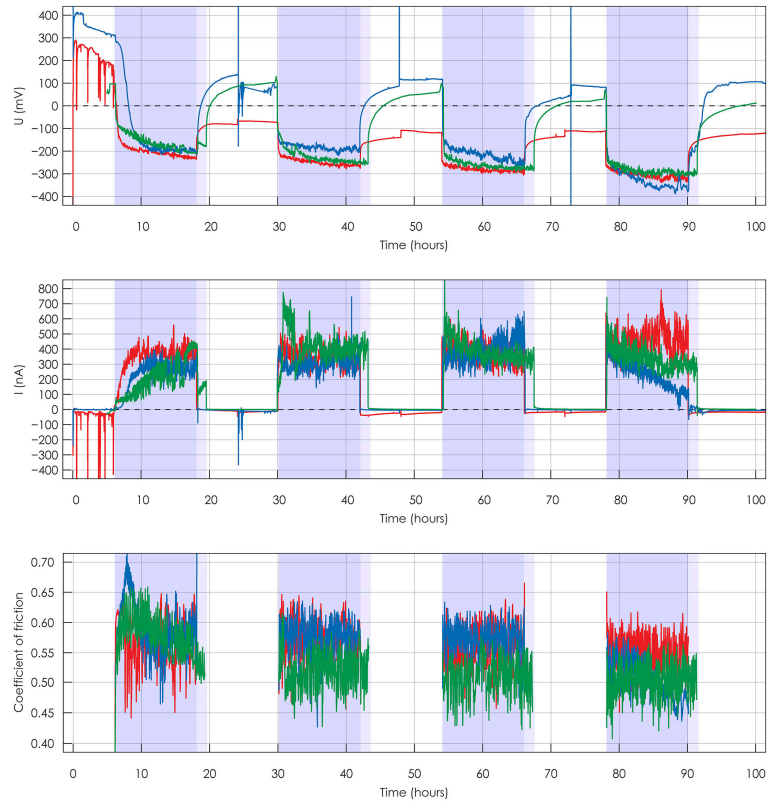
## Supplementary materials



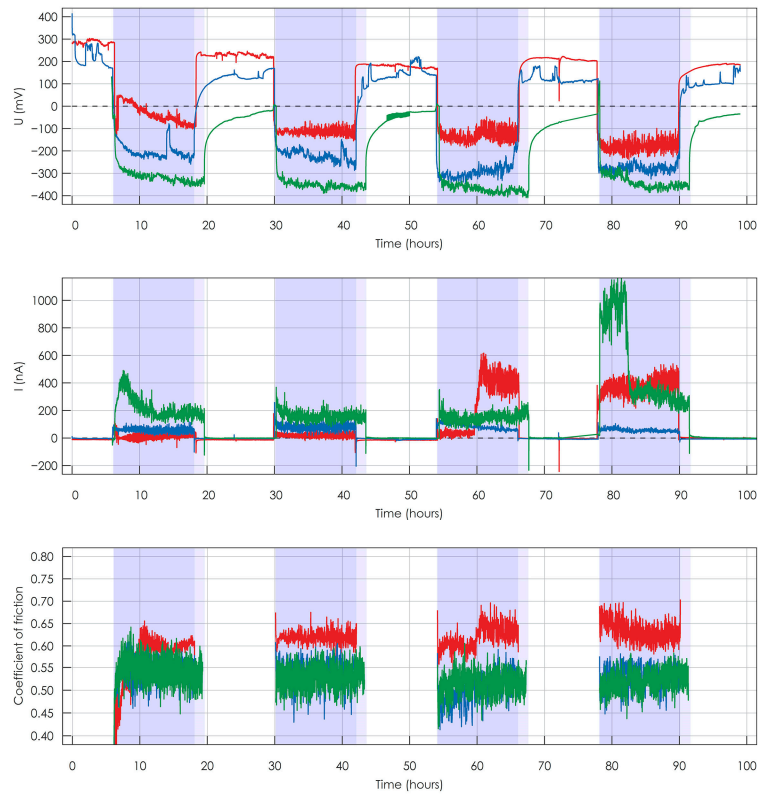
**Figure S1.** Electrochemical potential (U), current (I), and coefficient of friction measured on three (red, blue, green) as-received NiTi archwires (highlighted sections represent intervals where the specimen was exposed to tribocorrosion cycles).



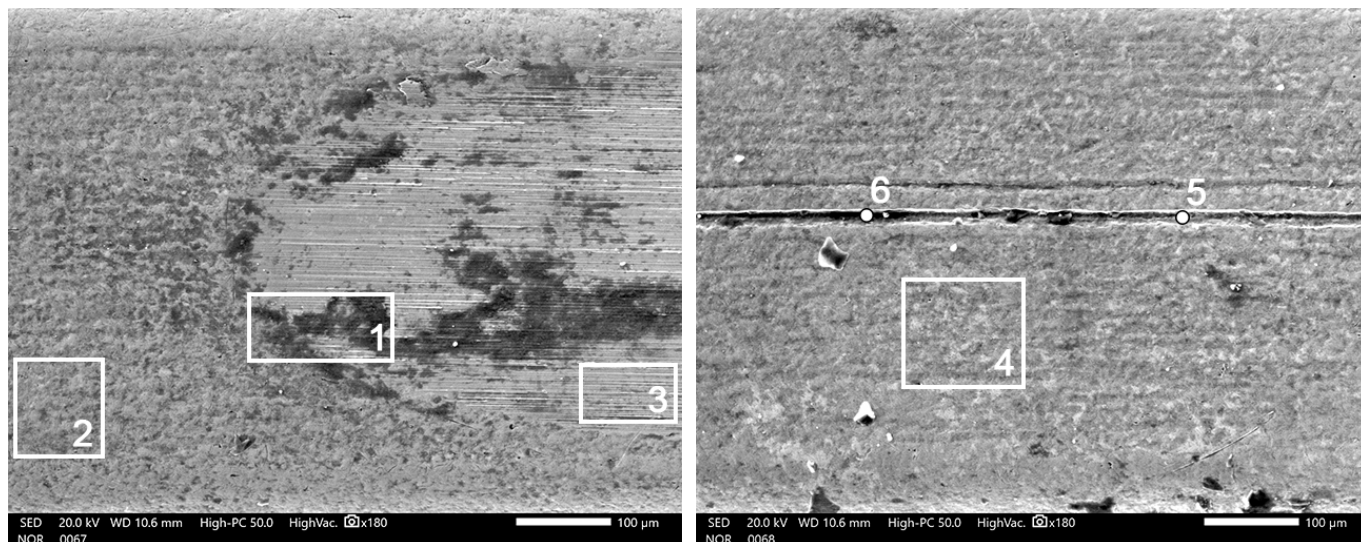
**Figure S2.** Electrochemical potential (U), current (I), and coefficient of friction measured on three (red, blue, green) in-vivo aged NiTi archwires (highlighted sections represent intervals where the specimen was exposed to tribocorrosion cycles).



**Figure S3.** Electrochemical potential (U), current (I), and coefficient of friction measured on three (red, blue, green) as-received SS archwires (highlighted sections represent intervals where the specimen was exposed to tribocorrosion cycles).



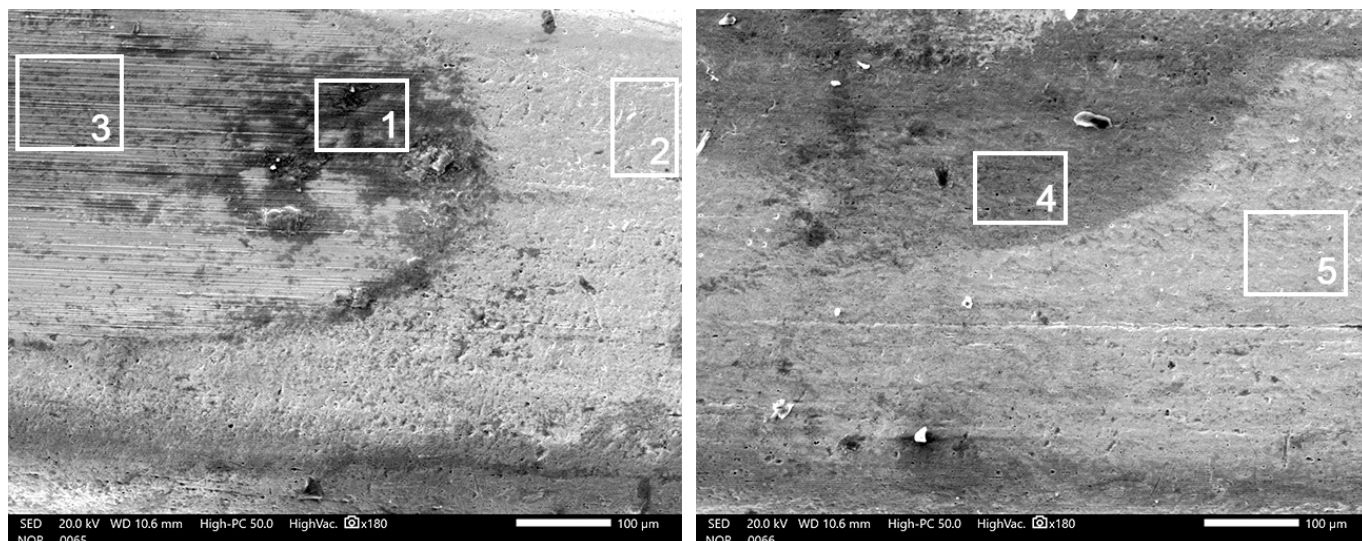
**Figure S4.** Electrochemical potential (U), current (I), and coefficient of friction measured on three (red, blue, green) in-vivo aged SS archwires (highlighted sections represent intervals where the specimen was exposed to tribocorrosion cycles).



**Figure S5.** Working electrode surface (left) and counter electrode surface (right) both obtained from an as-received NiTi archwire with labeled areas of EDS analysis: 1: edge of the wear track, 2: area outside the wear track, 3: area inside the wear track; 4, 5, 6 counter NiTi electrode.

**Table S1.** EDS surface analysis expressed as weight % of specific chemical elements detected at six locations (shown in Figure S5) of an as-received NiTi archwire.

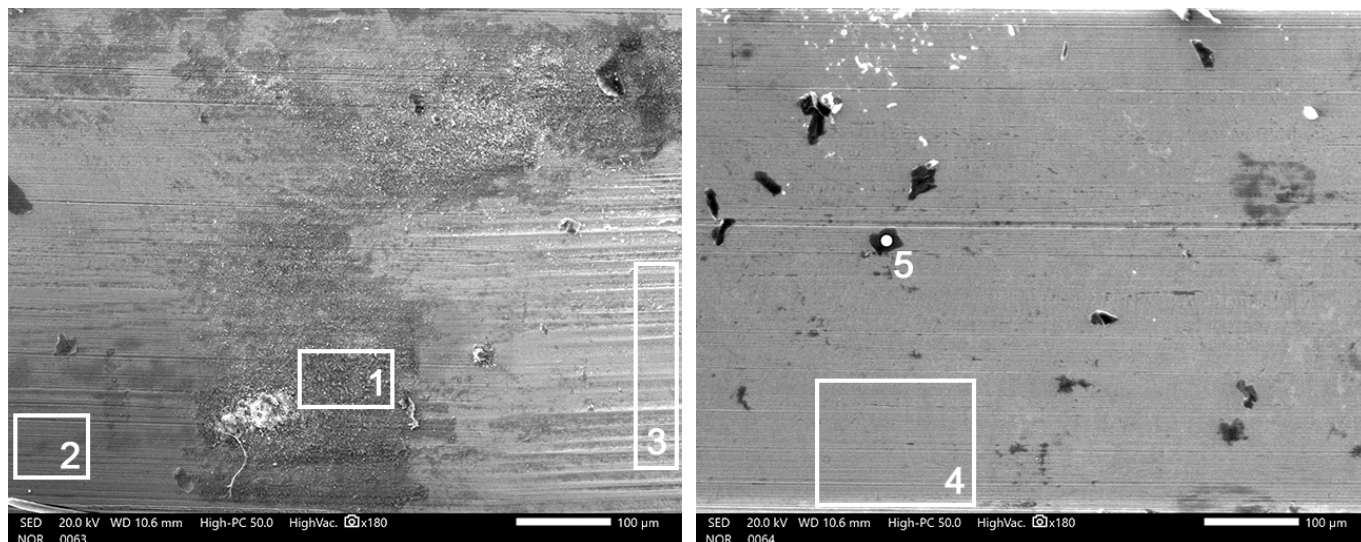
Location	C	O	P	K	Ca	Ti	Ni
1	17.24	16.76	1.15	0.47	0.61	30.06	33.72
2	10.52	2.75	-	-	-	39.68	47.06
3	11.55	4.35	-	-	-	38.38	45.73
4	9.99	2.86	-	-	-	39.84	47.31
5	12.10	3.04	-	-	-	38.00	46.86
6	25.37	5.29	-	-	-	31.15	38.19



**Figure S6.** Working electrode surface (left) and counter electrode surface (right) both obtained from an in-vivo aged NiTi archwire with labeled areas of EDS analysis: 1: edge of the wear track, 2: area outside the wear track, 3: area inside the wear track; 4, 5 counter NiTi electrode.

**Table S2.** EDS surface analysis expressed as weight % of specific chemical elements detected at six locations (shown in Figure S6) of an in-vivo aged NiTi archwire.

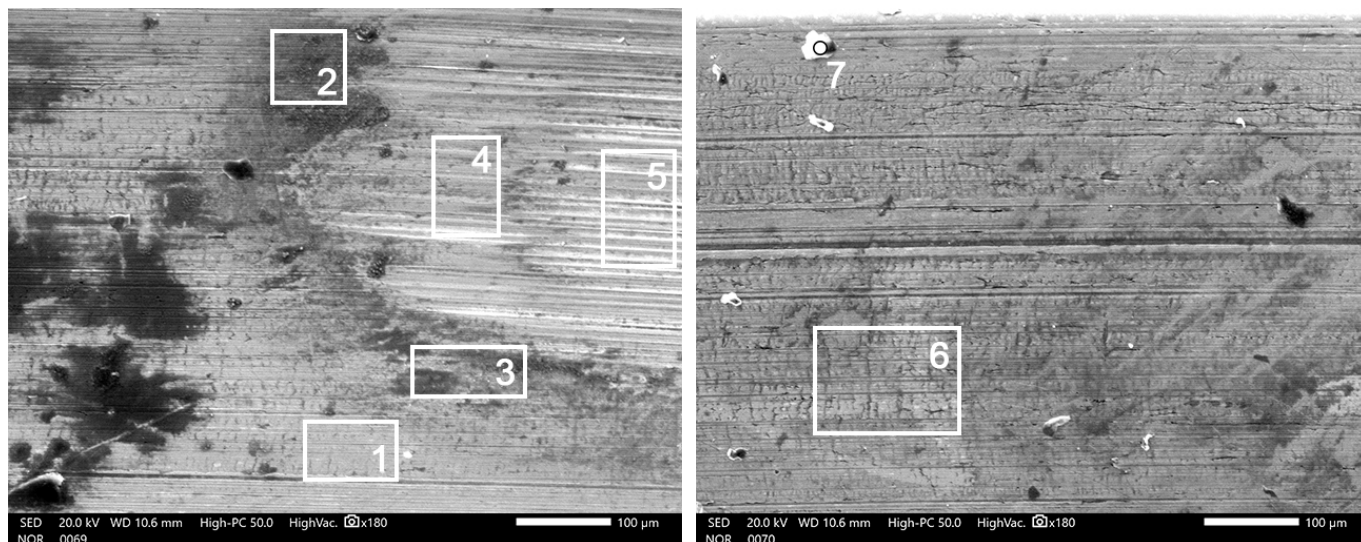
Location	C	O	Na	Si	P	K	Ca	Ti	Ni	Al
1	19.29	19.37	1.68	0.21	1.3	1.69	0.26	27.34	28.86	-
2	8.72	2.48	-	-	-	-	-	40.71	48.09	-
3	12.41	5.46	-	-	-	0.18	-	37.58	44.37	-
4	12.52	7.38	-	-	0.29	0.17	0.38	36.22	43.03	-
5	8.58	3.37	-	-	-	-	0.20	39.81	47.85	0.18



**Figure S7.** Working electrode surface (left) and counter electrode surface (right) both obtained from an as-received SS archwire with labeled areas of EDS analysis: 1: edge of the wear track, 2: area outside the wear track, 3: area inside the wear track; 4, 5 counter SS electrode.

**Table S3.** EDS surface analysis expressed as weight % of specific chemical elements detected at six locations (shown in Figure S7) of an as-received SS archwire.

Location	C	O	Na	Al	Si	P	S	Cl	K	Ca	Cr	Mn	Fe	Ni
1	15.19	24.55	4.31	0.13	0.31	5.57	0.13	0.90	4.41	1.12	8.49	0.60	31.37	2.92
2	9.57	4.27	1.00	0.30	0.61	0.62	-	0.12	0.25	0.16	16.48	1.07	58.31	7.24
3	9.61	2.93	0.80	0.33	0.61	0.35	-	-	0.23	-	17.1	1.06	59.66	7.31
4	9.75	1.66	-	0.61	0.70	-	-	-	-	-	17.29	1.23	61.21	7.55
5	42.60	4.72	-	0.21	0.35	-	0.09	0.10	-	-	10.59	0.69	36.37	4.27



**Figure S8.** Working electrode surface (left) and counter electrode surface (right) both obtained from an in-vivo aged SS archwire with labeled areas of EDS analysis: 1: area outside the wear track; 2,3: edge of the wear track; 4,5: area inside the wear track; 6, 7 counter SS electrode.

**Table S4.** EDS surface analysis expressed as weight % of specific chemical elements detected at six locations (shown in Figure S8) of an in-vivo aged SS archwire.

Location	C	O	Na	Al	Si	P	S	Cl	K	Ca	Cr	Mn	Fe	Ni	Mo	N
1	10.05	1.74	-	0.17	0.58	0.15	-	-	-	-	16.85	0.99	62.06	6.82	0.59	-
2	20.20	9.72	1.14	0.15	0.45	1.26	0.15	0.23	0.45	0.46	12.71	0.71	47.29	5.09	-	-
3	17.68	11.85	1.31	0.13	0.42	1.73	0.17	0.26	0.75	0.48	12.6	0.82	46.74	5.05	-	-
4	9.98	1.36	-	0.25	0.56	-	-	-	-	-	16.83	0.88	62.59	7.09	0.46	-
5	10.73	1.28	-	0.24	0.51	-	-	-	-	-	17.05	0.9	62.11	7.18	-	-
6	11.64	1.32	-	-	0.51	-	-	-	-	-	16.72	0.87	61.72	6.74	0.48	-
7	47.85	8.47	0.17	-	0.26	-	0.21	-	-	0.08	7.41	0.45	25.9	2.61	-	6.58