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Supporting information for article:

The dependence of X-ray elastic constants with respect to the penetration depth

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Table 1: Surface and bulk X-ray elastic constants for copper (A = 0.72 and a = 0.5431 nm). Single crystal elastic constants were taken from Epstein & Clarkson (1965).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-1.70	-1.93	0.46	7.53	8.23	0.46
{200}	-4.85	-3.76	0.38	16.84	13.71	0.38
{220}	-2.55	-2.39	0.06	9.85	9.60	0.06
{311}	-3.34	-2.90	0.33	12.42	11.13	0.33
{222}	-1.70	-1.93	0.46	7.56	8.23	0.46
{400}	-4.85	-3.76	0.38	16.84	13.71	0.38
{331}	-2.26	-2.26	–	9.20	9.20	–
{420}	-3.31	-2.89	0.33	12.33	11.09	0.33
{422}	-2.55	-2.39	0.06	9.85	9.60	0.06
{333}	-1.70	-1.93	0.46	7.56	8.23	0.46
{511}	-4.16	-3.38	0.37	14.85	12.56	0.37

Table 2: Surface and bulk X-ray elastic constants for aluminium (A = 0.02 and $a = 0.40498$ nm). Single crystal elastic constants were taken from Thomas (1968).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-4.55	-4.67	0.48	18.03	18.40	0.48
{200}	-5.48	-5.27	0.45	20.83	20.20	0.45
{220}	-4.77	-4.82	0.48	18.86	18.86	–
{311}	-4.99	-4.99	–	19.36	19.36	–
{222}	-4.55	-4.67	0.48	18.03	18.40	0.48
{400}	-5.48	-5.27	0.45	20.83	20.20	0.45
{331}	-4.71	-4.78	0.48	18.51	18.73	0.47
{420}	-4.98	-4.98	–	19.34	19.34	–
{422}	-4.77	-4.82	0.48	18.86	18.86	–
{333}	-4.55	-4.67	0.48	18.03	18.40	0.48
{511}	-5.28	-5.14	0.45	20.22	19.83	0.46

Table 3: Surface and bulk X-ray elastic constants for nickel ($A = 0.50$ and $a = 0.35251$ nm). Single crystal elastic constants were taken from Epstein & Clarkson (1965).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-0.89	-1.02	0.39	4.45	4.84	0.39
{200}	-2.36	-1.91	0.44	8.87	7.52	0.44
{220}	-1.24	-1.24	–	5.51	5.51	–
{311}	-1.65	-1.49	0.53	6.75	6.26	0.53
{222}	-0.89	-1.02	0.39	4.47	4.84	0.39
{400}	-2.36	-1.91	0.44	8.87	7.52	0.44
{331}	-1.13	-1.18	0.17	5.23	5.32	0.16
{420}	-1.63	-1.48	0.53	6.71	6.24	0.53
{422}	-1.24	-1.24	–	5.51	5.51	–
{333}	-0.89	-1.02	0.39	4.47	4.84	0.39
{511}	-2.03	-1.72	0.47	7.91	6.96	0.47

Table 4: Surface and bulk X-ray elastic constants for Fe-18Cr-14Ni alloy ($A = 0.75$ and $a = 0.3593$ nm). Single crystal elastic constants were taken from Teklu (2004).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-0.80	-0.95	0.36	4.64	5.09	0.36
{200}	-2.92	-2.18	0.40	10.98	8.77	0.40
{220}	-1.33	-1.26	0.53	6.23	6.00	0.52
{311}	-1.92	-1.60	0.44	7.98	7.03	0.43
{222}	-0.80	-0.95	0.36	4.65	5.09	0.36
{400}	-2.92	-2.18	0.40	10.98	8.77	0.40
{331}	-1.18	-1.17	1.35	5.74	5.74	–
{420}	-1.90	-1.59	0.44	7.92	7.00	0.44
{422}	-1.33	-1.26	0.53	6.23	6.00	0.52
{333}	-0.80	-0.95	0.36	4.65	5.09	0.36
{511}	-2.41	-1.92	0.51	9.63	7.99	0.51

Table 5: Surface and bulk X-ray elastic constants for $\alpha-$iron ($A = 0.51$ and $a = 0.28665$ nm). Single crystal elastic constants were taken from Leese & Lord Jr. (1968).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{110}	-1.33	-1.31	0.43	5.92	5.92	–
{200}	-2.54	-2.04	0.37	9.53	8.11	0.37
{211}	-1.33	-1.31	0.43	5.92	5.92	–
{220}	-1.33	-1.31	0.43	5.92	5.92	–
{222}	-0.94	-1.07	0.38	4.83	5.18	0.38
{310}	-2.10	-1.78	0.38	8.26	7.32	0.38
{222}	-0.94	-1.07	0.38	4.83	5.18	0.38
{321}	-1.33	-1.31	0.43	5.92	5.92	–
{400}	-2.54	-2.04	0.37	9.53	8.11	0.37
{330}	-1.33	-1.31	0.43	5.92	5.92	–
{420}	-1.76	-1.58	0.38	7.27	6.71	0.38

Table 6: Surface and bulk X-ray elastic constants for $\alpha-$tantalum ($A = 0.11$ and $a = 0.33204$ nm). Single crystal elastic constants were taken from Soga (1966)

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{110}	-1.75	-1.75	–	7.00	7.00	–
{200}	-2.32	-2.12	0.43	8.70	8.12	0.43
{211}	-1.75	-1.75	–	7.00	7.00	–
{220}	-1.75	-1.75	–	7.00	7.00	–
{222}	-1.54	-1.62	0.40	6.37	6.62	0.40
{310}	-2.10	-1.99	0.45	8.07	7.71	0.44
{222}	-1.54	-1.62	0.40	6.37	6.62	0.40
{321}	-1.75	-1.75	–	7.00	7.00	–
{400}	-2.32	-2.12	0.43	8.70	8.12	0.43
{330}	-1.75	-1.75	–	7.00	7.00	–
{420}	-1.94	-1.88	0.46	7.58	7.40	0.46

Table 7: Surface and bulk X-ray elastic constants for chromium ($A = 0.07$ and $a = 0.28839$ nm). Single crystal elastic constants were taken from Sumer & Smith (1963).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{110}	-0.80	-0.77	0.44	4.59	4.50	0.44
{200}	-0.52	-0.58	0.38	3.76	3.93	0.38
{211}	-0.80	-0.77	0.44	4.59	4.50	0.44
{220}	-0.80	-0.77	0.44	4.59	4.50	0.44
{222}	-0.89	-0.84	0.40	4.87	4.70	0.40
{310}	-0.62	-0.65	0.34	4.06	4.13	0.35
{222}	-0.89	-0.84	0.40	4.87	4.70	0.40
{321}	-0.80	-0.77	0.44	4.59	4.50	0.44
{400}	-0.52	-0.58	0.38	3.76	3.93	0.38
{330}	-0.80	-0.77	0.44	4.59	4.50	0.44
{420}	-0.70	-0.70	–	4.30	4.30	–

Table 8: Surface and bulk X-ray elastic constants for the Ti-27Nb-7Al alloy ($A = 0.77$ and $a = 0.3290$ nm). Single crystal elastic constants were taken from Wang *et al.* (2019).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{110}	-5.19	-4.85	0.09	18.18	17.16	0.09
{200}	-9.35	-7.26	0.34	30.26	24.40	0.34
{211}	-5.19	-4.85	0.09	17.74	17.16	0.09
{220}	-5.19	-4.85	0.09	17.74	17.16	0.09
{222}	-3.64	-4.03	0.48	13.52	14.70	0.48
{310}	-7.84	-6.40	0.31	25.73	21.82	0.31
{222}	-3.64	-4.03	0.48	13.52	14.70	0.48
{321}	-5.19	-4.85	0.09	17.74	17.16	0.09
{400}	-9.35	-7.26	0.34	30.26	24.40	0.34
{330}	-5.19	-4.85	0.09	17.74	17.16	0.09
{420}	-6.67	-5.73	0.26	22.24	19.79	0.26

Table 9: Surface and bulk X-ray elastic constants for $\alpha-$titanium ($A = 0.08$, $a = 0.29508$ nm and $c = 0.46855$ nm). Single crystal elastic constants were taken from Fisher & Renken (1964).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{100}	-3.11	-2.96	0.35	12.33	11.98	0.29
{110}	-3.11	-2.96	0.35	12.26	11.98	0.29
{002}	-2.04	-2.33	0.43	9.52	10.14	0.45
{101}	-2.95	-2.89	0.39	11.91	11.76	0.38
{102}	-2.67	-2.72	0.62	11.28	11.28	–
{110}	-3.11	-2.96	0.35	12.26	11.98	0.29
{103}	-2.46	-2.58	0.55	10.63	10.88	0.62
{200}	-3.11	-2.96	0.35	12.26	11.98	0.29
{112}	-2.91	-2.86	0.38	11.81	11.70	0.37
{201}	-3.07	-2.95	0.37	12.17	11.93	0.32
{004}	-2.04	-2.33	0.43	9.52	10.14	0.45
{202}	-2.95	-2.89	0.39	11.91	11.76	0.38
{104}	-2.33	-2.50	0.51	10.28	10.63	0.56
{203}	-2.80	-2.80	–	11.53	11.53	–
{120}	-3.11	-2.96	0.35	12.26	11.98	0.29
{211}	-3.09	-2.95	0.36	12.21	11.95	0.32
{114}	-2.59	-2.67	0.58	11.00	11.13	0.66
{105}	-2.24	-2.45	0.49	10.06	10.49	0.53
{122}	-3.01	-2.92	0.39	12.05	11.86	0.35

Table 10: Surface and bulk X-ray elastic constants for magnesium ($A = 0.02$, $a = 0.32094$ nm and $c = 0.52108$ nm). Single crystal elastic constants were taken from Wazzan & Robinson (1967).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{100}	-6.49	-6.49	–	28.76	28.76	–
{110}	-6.49	-6.49	–	28.76	28.76	–
{002}	-5.36	-5.77	0.43	25.82	26.88	0.44
{101}	-6.83	-6.73	0.35	29.54	29.54	–
{102}	-6.69	-6.69	–	29.49	29.49	–
{110}	-6.49	-6.49	–	28.76	28.76	–
{103}	-6.37	-6.45	0.54	28.81	28.81	–
{200}	-6.49	-6.49	–	28.76	28.76	–
{112}	-6.87	-6.75	0.36	29.94	29.62	0.36
{201}	-6.58	-6.58	–	29.06	29.06	–
{004}	-5.36	-5.77	0.43	25.82	26.88	0.44
{202}	-6.83	-6.73	0.35	29.54	29.54	–
{104}	-6.07	-6.25	0.47	27.84	28.25	0.52
{203}	-6.87	-6.76	0.36	30.00	29.68	0.36
{120}	-6.49	-6.49	–	28.76	28.76	–
{211}	-6.55	-6.55	–	28.95	28.95	–
{114}	-6.62	-6.62	–	29.29	29.29	–
{105}	-5.87	-6.12	0.45	27.28	27.87	0.48
{122}	-6.74	-6.67	0.33	29.33	29.33	–

Table 11: Surface and bulk X-ray elastic constants for silicon ($A = 0.11$ and $a = 0.5431$ nm). Single crystal elastic constants were taken from McSkimin & Andreatch Jr (1964)

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-1.05	-1.14	0.49	6.54	6.83	0.49
{220}	-1.25	-1.28	1.21	7.17	7.25	1.22
{311}	-0.43	-1.43	-0.01	7.88	7.71	-0.01
{400}	-1.93	-1.70	0.31	9.14	8.49	0.31
{331}	-1.19	-1.24	0.76	6.99	7.13	0.77
{422}	-1.25	-1.28	1.21	7.17	7.25	1.22
{333}	-1.05	-1.14	0.49	6.55	6.83	0.49
{511}	-1.74	-1.58	0.24	8.56	8.14	0.24
{440}	-1.25	-1.28	1.21	7.17	7.25	1.22
{531}	-1.34	-1.34	–	7.44	7.44	–
{620}	-1.69	-1.55	0.21	8.40	8.04	0.21

Table 12: Surface and bulk X-ray elastic constants for $\alpha-$zinc ($A = 0.64$, $a = 0.26649$ nm and $c = 0.49468$ nm). Single crystal elastic constants were taken from Alers & Neighbours (1908).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{100}	-2.47	-2.42	0.73	10.90	10.90	–
{110}	-2.47	-2.42	0.73	10.90	10.90	–
{002}	-5.51	-3.90	0.34	23.14	18.50	0.37
{101}	-2.07	-2.28	0.10	10.68	11.05	0.16
{102}	-2.42	-2.42	–	12.35	12.35	–
{110}	-2.47	-2.42	0.73	10.90	10.90	–
{103}	-3.10	-2.77	0.42	15.15	14.01	0.44
{200}	-2.47	-2.42	0.73	10.90	10.90	–
{112}	-2.05	-2.28	0.11	10.76	11.17	0.15
{201}	-2.36	-2.36	–	10.83	10.89	0.05
{004}	-5.51	-3.90	0.34	23.14	18.50	0.37
{202}	-2.07	-2.28	0.10	10.68	11.05	0.16
{104}	-3.75	-3.07	0.37	17.40	15.29	0.40
{203}	-2.01	-2.30	0.07	11.20	11.57	0.03
{120}	-2.47	-2.42	0.73	10.90	10.90	–
{211}	-2.38	-2.38	–	10.89	10.89	–
{114}	-2.60	-2.52	0.89	13.22	12.88	0.69
{105}	-4.21	-3.29	0.35	18.95	16.16	0.38
{122}	-2.22	-2.31	0.13	10.69	10.93	0.15

Table 13: Surface and bulk X-ray elastic constants for $\alpha-$zirconium ($A = 0.05$, $a = 0.3232$ nm and $c = 0.5147$ nm). Single crystal elastic constants were taken from Fisher & Renken (1964).

$\{hkl\}$	$\bar{s}_{1,hkl}$ [0] TPa^{-1}	$\bar{s}_{1,hkl}$ [∞] TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}$ $\bar{s}_{2,hkl}$ [0] TPa^{-1}	$\frac{1}{2}$ $\bar{s}_{2,hkl}$ [∞] TPa^{-1}	$k_{2,hkl}$
{100}	-3.22	-3.34	0.07	13.94	13.60	-0.04
{110}	-3.22	-3.34	0.07	13.48	13.60	-0.04
{002}	-2.65	-2.88	0.44	11.28	11.96	0.43
{101}	-3.67	-3.60	0.64	14.56	14.33	0.65
{102}	-3.71	-3.61	0.65	14.55	14.27	0.64
{110}	-3.22	-3.34	0.07	13.48	13.60	-0.04
{103}	-3.42	-3.42	–	13.66	13.66	–
{200}	-3.22	-3.34	0.07	13.48	13.60	-0.04
{112}	-3.72	-3.63	0.59	14.68	14.41	0.58
{201}	-3.44	-3.44	–	13.89	13.89	–
{004}	-2.65	-2.88	0.44	11.28	11.96	0.43
{202}	-3.67	-3.60	0.64	14.56	14.33	0.65
{104}	-3.27	-3.27	–	13.01	13.16	0.05
{203}	-3.76	-3.66	0.57	14.77	14.45	0.56
{120}	-3.22	-3.34	0.07	13.48	13.60	-0.04
{211}	-3.40	-3.40	–	13.78	13.78	–
{114}	-3.63	-3.55	0.76	14.31	14.09	0.76
{105}	-3.04	-3.16	0.20	12.53	12.83	0.24
{122}	-3.53	-3.53	–	14.14	14.14	–

Table 14: Surface and bulk X-ray elastic constants for germanium ($A = 0.14$ and $a = 0.5658$ nm). Single crystal elastic constants were taken from Bogardus (1965).

$\{hkl\}$	$\bar{s}_{1,hkl}$ [0] TPa^{-1}	$\bar{s}_{1,hkl}$ [∞] TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}$ $\bar{s}_{2,hkl}$ [0] TPa^{-1}	$\frac{1}{2}$ $\bar{s}_{2,hkl}$ [∞] TPa^{-1}	$k_{2,hkl}$
{111}	-1.16	-1.27	0.41	7.92	8.25	0.41
{220}	-1.46	-1.46	–	8.81	8.81	–
{311}	-1.78	-1.67	0.44	9.78	9.45	0.45
{400}	-2.34	-2.04	0.44	11.45	10.56	0.43
{331}	-1.37	-1.40	0.36	8.54	8.65	0.36
{422}	-1.46	-1.46	–	8.81	8.81	–
{333}	-1.16	-1.27	0.41	7.92	8.25	0.41
{511}	-2.09	-1.87	0.44	10.70	10.06	0.44
{440}	-1.46	-1.46	–	8.81	8.81	–
{531}	-1.59	-1.54	0.48	9.21	9.08	0.47
{620}	-2.02	-1.82	0.44	10.49	9.92	0.44

Table 15: Surface and bulk X-ray elastic constants for cadmium telluride ($A = 0.38$ and $a = 0.648$ nm). Single crystal elastic constants were taken from Deligoz *et al.* (2006).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-6.48	-7.22	0.43	27.35	29.56	0.43
{200}	-14.06	-11.76	0.37	49.83	43.18	0.37
{220}	-8.24	-8.35	0.84	32.74	32.96	0.84
{311}	-10.27	-9.61	0.35	38.84	36.75	0.35
{222}	-6.48	-7.22	0.43	27.47	29.56	0.43
{400}	-14.06	-11.76	0.37	49.83	43.18	0.37
{420}	-10.21	-9.57	0.35	38.64	36.62	0.35
{422}	-8.24	-8.35	0.84	32.74	32.96	0.84
{440}	-8.24	-8.35	0.84	32.74	32.96	0.84
{600}	-14.06	-11.76	0.37	49.83	43.18	0.37
{442}	-7.25	-7.72	0.47	29.79	31.07	0.47

Table 16: Surface and bulk X-ray elastic constants for titanium carbide ($A = 0.01$ and $a = 0.43186$ nm). Single crystal elastic constants were taken from Gilman & Roberts (1961).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-0.48	-0.47	0.48	2.80	2.80	–
{200}	-0.42	-0.43	0.49	2.62	2.66	0.49
{220}	-0.46	-0.46	–	2.77	2.77	–
{311}	-0.45	-0.45	–	2.73	2.73	–
{222}	-0.48	-0.47	0.48	2.80	2.80	–
{400}	-0.42	-0.43	0.49	2.62	2.66	0.49
{331}	-0.47	-0.47	–	2.78	2.78	–
{420}	-0.45	-0.45	–	2.73	2.73	–
{422}	-0.46	-0.46	–	2.77	2.77	–
{333}	-0.48	-0.47	0.48	2.80	2.80	–
{511}	-0.43	-0.44	0.47	2.69	2.69	–

Table 17: Surface and bulk X-ray elastic constants for 2H silicon carbide ($A = 0.08$, $a = 0.30763$ nm and $c = 0.50486$ nm). Single crystal elastic constants were taken from Pizzagalli (2021).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{100}	-0.27	-0.29	0.44	2.32	2.40	0.48
{002}	-0.20	-0.24	0.40	2.10	2.22	0.39
{101}	-0.39	-0.38	0.35	2.69	2.64	0.33
{102}	-0.44	-0.40	0.33	2.82	2.72	0.35
{2-10}	-0.27	-0.29	0.44	2.32	2.40	0.48
{103}	-0.39	-0.37	0.21	2.66	2.61	0.27
{2-12}	-0.41	-0.39	0.36	2.75	2.68	0.35
{201}	-0.31	-0.32	0.49	2.46	2.49	0.59
{203}	-0.44	-0.40	0.36	2.82	2.73	0.36
{210}	-0.27	-0.29	0.44	2.32	2.40	0.48
{211}	-0.29	-0.31	0.47	2.41	2.45	0.53
{114}	-0.43	-0.39	0.30	2.78	2.70	0.34
{105}	-0.30	-0.30	0.92	2.39	2.43	0.62
{212}	-0.35	-0.35	–	2.58	2.57	0.04
{300}	-0.27	-0.29	0.44	2.32	2.40	0.48
{213}	-0.41	-0.39	0.36	2.74	2.68	0.35
{214}	-0.44	-0.40	0.36	2.82	2.73	0.36

Table 18: Surface and bulk X-ray elastic constants for 4H silicon carbide ($A = 0.06$, $a = 0.30784$ nm and $c = 1.00776$ nm). Single crystal elastic constants were taken from Pizzagalli (2021).

$\{hkl\}$	$\bar{s}_{1,hkl}$ [0] TPa^{-1}	$\bar{s}_{1,hkl}$ [∞] TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\ \bar{s}_{2,hkl}$ [0] TPa^{-1}	$\frac{1}{2}\ \bar{s}_{2,hkl}$ [∞] TPa^{-1}	$k_{2,hkl}$
{102}	-0.38	-0.37	0.42	2.67	2.62	0.41
{103}	-0.42	-0.39	0.38	2.77	2.69	0.39
{104}	-0.42	-0.39	0.33	2.77	2.68	0.34
{105}	-0.41	-0.37	0.27	2.71	2.63	0.27
{110}	-0.28	-0.30	0.41	2.37	2.41	0.42
{106}	-0.39	-0.35	0.20	2.63	2.57	0.19
{202}	-0.32	-0.32	0.40	2.49	2.49	–
{205}	-0.41	-0.38	0.40	2.73	2.66	0.40
{206}	-0.42	-0.39	0.38	2.77	2.69	0.39
{109}	-0.30	-0.31	-0.10	2.43	2.43	–
{212}	-0.30	-0.31	0.41	2.46	2.46	–
{213}	-0.33	-0.33	–	2.51	2.51	–
{1010}	-0.30	-0.30	–	2.40	2.40	–
{214}	-0.35	-0.35	0.43	2.58	2.56	0.39
{215}	-0.38	-0.36	0.42	2.65	2.61	0.40
{300}	-0.28	-0.30	0.41	2.37	2.41	0.42
{209}	-0.42	-0.38	0.30	2.74	2.65	0.31

Table 19: Surface and bulk X-ray elastic constants for 6H silicon carbide ($A = 0.05$, $a = 0.30793$ nm and $c = 1.51091$ nm). Single crystal elastic constants were taken from Pizzagalli (2021).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{101}	-0.30	-0.31	0.24	2.42	2.46	0.29
{006}	-0.20	-0.24	0.40	2.11	2.22	0.37
{102}	-0.34	-0.34	–	2.54	2.54	–
{103}	-0.38	-0.36	0.58	2.66	2.62	0.53
{104}	-0.40	-0.38	0.46	2.73	2.66	0.45
{107}	-0.39	-0.37	0.36	2.69	2.63	0.44
{108}	-0.38	-0.36	0.34	2.64	2.60	0.45
{2-10}	-0.28	-0.30	0.30	2.38	2.43	0.35
{109}	-0.36	-0.35	0.30	2.59	2.56	0.49
{2-16}	-0.39	-0.37	0.50	2.70	2.64	0.49
{208}	-0.40	-0.38	0.46	2.73	2.66	0.45
{209}	-0.41	-0.38	0.43	2.74	2.67	0.44
{211}	-0.28	-0.30	0.29	2.38	2.43	0.34
{213}	-0.30	-0.31	0.21	2.44	2.47	0.28
{1015}	-0.29	-0.30	0.50	2.36	2.40	0.33
{217}	-0.36	-0.36	0.73	2.62	2.59	0.60
{219}	-0.39	-0.37	0.51	2.69	2.64	0.49

Table 20: Surface and bulk X-ray elastic constants for 3C silicon carbide ($A = 0.18$ and $a = 0.4348$ nm). Single crystal elastic constants were taken from Pizzagalli (2021).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-0.18	-0.22	0.34	2.10	2.22	0.34
{200}	-0.56	-0.47	0.36	3.24	2.96	0.36
{220}	-0.27	-0.28	0.11	2.38	2.41	0.11
{311}	-0.38	-0.35	0.47	2.70	2.61	0.47
{222}	-0.18	-0.22	0.34	2.11	2.22	0.34
{400}	-0.56	-0.47	0.36	3.24	2.96	0.36
{331}	-0.24	-0.26	0.24	2.30	2.35	0.24
{420}	-0.37	-0.35	0.48	2.69	2.61	0.47
{422}	-0.27	-0.28	0.11	2.38	2.41	0.11
{333}	-0.18	-0.22	0.34	2.11	2.22	0.34
{511}	-0.48	-0.42	0.39	3.00	2.81	0.39

Table 21: Surface and bulk X-ray elastic constants for tungsten carbide ($A = 0.07$, $a = 0.29059$ nm and $c = 0.28367$ nm). Single crystal elastic constants were taken from Lee & Gilmore (1982).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{001}	-0.32	-0.33	0.35	1.60	1.64	0.38
{100}	-0.38	-0.36	0.46	1.96	1.91	0.44
{101}	-0.31	-0.32	0.19	1.68	1.70	0.21
{110}	-0.38	-0.36	0.46	1.96	1.91	0.44
{002}	-0.32	-0.33	0.35	1.61	1.64	0.38
{111}	-0.34	-0.34	–	1.79	1.79	–
{200}	-0.38	-0.36	0.46	1.96	1.91	0.44
{102}	-0.31	-0.32	0.38	1.60	1.64	0.39
{201}	-0.35	-0.34	1.17	1.82	1.82	–
{112}	-0.31	-0.32	0.28	1.65	1.68	0.30
{210}	-0.38	-0.36	0.46	1.96	1.91	0.44
{003}	-0.32	-0.33	0.35	1.61	1.64	0.38
{202}	-0.31	-0.32	0.19	1.68	1.70	0.21
{211}	-0.36	-0.35	0.72	1.88	1.85	0.63
{103}	-0.31	-0.32	0.38	1.60	1.64	0.38
{300}	-0.38	-0.36	0.46	1.96	1.91	0.44
{301}	-0.36	-0.35	0.64	1.89	1.86	0.58

Table 22: Surface and bulk X-ray elastic constants for silicon nitride ($A = 0.14$, $a = 0.76044$ nm and $c = 0.29075$ nm). Single crystal elastic constants were taken from Vogelgesang *et al.* (2000).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{100}	-0.82	-0.82	–	3.80	3.80	–
{110}	-0.82	-0.82	–	3.80	3.80	–
{200}	-0.82	-0.82	–	3.80	3.80	–
{101}	-0.73	-0.75	1.58	3.40	3.48	1.23
{210}	-0.82	-0.82	–	3.80	3.80	–
{301}	-1.01	-0.96	0.36	4.32	4.16	0.38
{221}	-1.01	-0.95	0.40	4.30	4.15	0.40
{320}	-0.82	-0.82	–	3.80	3.80	–
{002}	-0.48	-0.58	0.56	2.64	2.93	0.54
{231}	-0.98	-0.93	0.45	4.22	4.10	0.41
{411}	-0.97	-0.93	0.46	4.20	4.09	0.42
{330}	-0.82	-0.82	–	3.80	3.80	–
{212}	-0.83	-0.83	–	3.71	3.71	–
{511}	-0.94	-0.91	0.49	4.11	4.03	0.41
{430}	-0.82	-0.82	–	3.80	3.80	–
{232}	-0.99	-0.94	0.21	4.22	4.08	0.30
{142}	-1.00	-0.95	0.24	4.25	4.10	0.32
{610}	-0.82	-0.82	–	3.80	3.80	–
{521}	-0.92	-0.89	0.51	4.06	4.00	0.40

Table 23: Surface and bulk X-ray elastic constants for titanium nitride ($A = 0.06$ and $a = 0.424$ nm). Single crystal elastic constants were taken from Fodil *et al.* (2014).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-0.64	-0.60	0.43	2.95	2.85	0.43
{200}	-0.41	-0.45	0.40	2.29	2.40	0.40
{220}	-0.58	-0.56	0.57	2.78	2.74	0.58
{311}	-0.51	-0.52	0.14	2.59	2.61	0.15
{222}	-0.64	-0.60	0.43	2.95	2.85	0.43
{400}	-0.41	-0.45	0.40	2.29	2.40	0.40
{331}	-0.59	-0.58	0.50	2.83	2.77	0.51
{420}	-0.51	-0.52	0.13	2.60	2.62	0.13
{422}	-0.58	-0.56	0.57	2.78	2.74	0.58
{333}	-0.64	-0.60	0.43	2.95	2.85	0.43
{511}	-0.46	-0.48	0.34	2.42	2.50	0.34

Table 24: Surface and bulk X-ray elastic constants for α-corundum ($A = 0.07$, $a = 0.47606$ nm and $c = 1.2994$ nm). Single crystal elastic constants were taken from Tefft (1966).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{012}	-0.51	-0.54	0.13	2.85	2.93	0.13
{104}	-0.67	-0.64	0.62	3.37	3.26	0.62
{110}	-0.55	-0.55	–	2.95	2.95	–
{113}	-0.62	-0.61	0.96	3.19	3.13	0.97
{024}	-0.51	-0.54	0.13	2.88	2.93	0.13
{116}	-0.62	-0.61	1.01	3.22	3.16	0.95
{214}	-0.67	-0.64	0.65	3.33	3.22	0.65
{300}	-0.55	-0.55	–	2.95	2.95	–
{226}	-0.62	-0.61	0.96	3.19	3.13	0.97
{2110}	-0.65	-0.62	0.72	3.31	3.22	0.70
{1310}	-0.57	-0.57	–	3.04	3.04	–
{3012}	-0.67	-0.64	0.62	3.37	3.26	0.62
{2014}	-0.53	-0.55	0.16	2.99	3.02	0.06
{416}	-0.69	-0.65	0.60	3.38	3.25	0.60
{4010}	-0.74	-0.68	0.45	3.57	3.38	0.45
{330}	-0.55	-0.55	–	2.95	2.95	–

Table 25: Surface and bulk X-ray elastic constants for cubic zirconia ($A = 0.52$ and $a = 0.509$ nm). Single crystal elastic constants were taken from Kandil *et al.* (1984).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{111}	-2.10	-1.79	0.39	8.00	7.06	0.39
{200}	-0.71	-0.87	0.50	3.82	4.28	0.50
{220}	-1.77	-1.56	0.30	6.90	6.35	0.30
{311}	-1.47	-1.30	0.06	5.76	5.57	0.05
{222}	-2.10	-1.79	0.39	7.94	7.06	0.39
{400}	-0.71	-0.87	0.50	3.82	4.28	0.50
{331}	-1.86	-1.62	0.33	7.20	6.56	0.33
{420}	-1.46	-1.30	0.07	5.80	5.60	0.07
{422}	-1.77	-1.56	0.30	6.90	6.35	0.30
{333}	-2.10	-1.79	0.39	7.94	7.06	0.39
{511}	-1.00	-1.06	0.94	4.69	4.85	0.93
{440}	-1.77	-1.56	0.30	6.90	6.35	0.30
{531}	-1.61	-1.45	0.24	6.43	6.03	0.24
{442}	-1.95	-1.69	0.35	7.48	6.75	0.35
{600}	-0.71	-0.87	0.50	3.82	4.28	0.50
{620}	-1.09	-1.11	2.11	4.94	5.02	2.14
{533}	-1.92	-1.66	0.34	7.36	6.67	0.34

Table 26: Surface and bulk X-ray elastic constants for tetragonal zirconia ($A = 0.23$, $a = 0.3579$ nm and $c = 0.5165$ nm). Single crystal elastic constants were taken from Kisi & Howard (1998).

$\{hkl\}$	$\bar{s}_{1,hkl}\,[0]$ TPa^{-1}	$\bar{s}_{1,hkl}\,[\infty]$ TPa^{-1}	$k_{1,hkl}$	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[0]$ TPa^{-1}	$\frac{1}{2}\,\bar{s}_{2,hkl}\,[\infty]$ TPa^{-1}	$k_{2,hkl}$
{101}	-1.53	-1.45	0.29	6.81	6.55	0.31
{002}	-0.74	-0.93	0.41	4.91	5.39	0.39
{110}	-1.57	-1.47	0.23	6.67	6.44	0.21
{112}	-1.77	-1.61	0.39	7.62	7.14	0.39
{200}	-0.92	-1.02	0.61	4.75	5.11	0.59
{103}	-1.26	-1.26	–	6.28	6.28	–
{211}	-1.49	-1.42	0.23	6.53	6.33	0.21
{202}	-1.53	-1.45	0.29	6.81	6.55	0.31
{004}	-0.74	-0.93	0.41	4.91	5.39	0.39
{220}	-1.57	-1.47	0.23	6.67	6.44	0.21
{213}	-1.71	-1.58	0.41	7.45	7.02	0.41
{301}	-1.06	-1.12	0.86	5.21	5.42	0.77
{204}	-1.51	-1.43	0.24	6.93	6.69	0.28
{312}	-1.47	-1.40	0.21	6.51	6.33	0.20
{105}	-0.99	-1.09	0.55	5.58	5.81	0.58
{224}	-1.77	-1.61	0.39	7.62	7.14	0.39
{400}	-0.92	-1.02	0.61	4.75	5.11	0.59
{215}	-1.49	-1.41	0.19	6.89	6.66	0.25
{314}	-1.66	-1.54	0.41	7.29	6.91	0.41