

Authors	Energy Range (eV)	Technique	Temperature (K) RT unless specified	Sample				Data Presentation	Remarks
				Film	X-tal	Bulk	Prep		
Sa39	2.6-27.6	Ref1		x			Ex	R	
KC63	0.06-0.5	Ellips				x		n,k	
KC65	0.05-5	Ellips				x	MP,EP	n,k, σ	table λ, n, k
LT66	0.06-0.25	Ellips				x	MP	$\epsilon_2/\lambda, -\epsilon_1$	
LTA66	0.1-3.5						MP	$\epsilon_2/\lambda, \epsilon_1$	
Le67	<4						MP	ϵ_2/λ	data from LT66 and LTA66
VAK67	3-14.4					x		R	polarimetry $3 < h\nu < 5$ eV, reflectance $4 < h\nu < 7$ eV, and photoemission $7.5 < h\nu < 14.4$ eV
GL68	2-5.6	m- θ				x		$\epsilon_2/\lambda, \epsilon_1$	
KNB68	5-12	Ellips						R; KK: $\sigma, \text{Im}(\epsilon^{-1}), \text{Im}(\epsilon+1)^{-1}, -\epsilon_1$	data from VAK67, KK analyzed
DS70			1200-2000					ϵ_H at $\lambda = 6560 \text{ \AA}$	
BaB74			1100-1800			x		ϵ_N at $\lambda = 6450 \text{ \AA}$	
LOW75	0.15-30	Ref1	4.2 K for $h\nu < 4.4$ eV RT for $h\nu > 4.4$ eV				EP	A,R; KK: $\epsilon_1, \epsilon_2, \sigma, \text{Im}(\epsilon^{-1}), \text{Im}(\epsilon+1)^{-1}$	absorptivity measured by calorimetry $h\nu < 4.4$ eV, reflectivity measured $h\nu > 4.4$ eV
W076	20-250	Trans		x			Ex	μ	optical absorption, synchrotron radiation

Authors	Energy Range (eV)	Technique	Temperature (K) RT unless specified	Sample				Data Presentation	Remarks
				Thin	X-tal	Bulk	Prep		
BDL77	0.03-3.1	Ref1				x	MP	R	also emissivity 400-850 K
LO Unpl	0.12-30		4.2 K for $h\nu < 4.4$ eV RT for $h\nu > 4.4$ eV			x		R; KK: $n, k, \epsilon_1, \epsilon_2,$ $\text{Im}(\epsilon^{-1}), \mu$	absorptivity measured by calorimetry for $h\nu < 4.4$ eV, reflectivity measured for $h\nu > 4.4$ eV

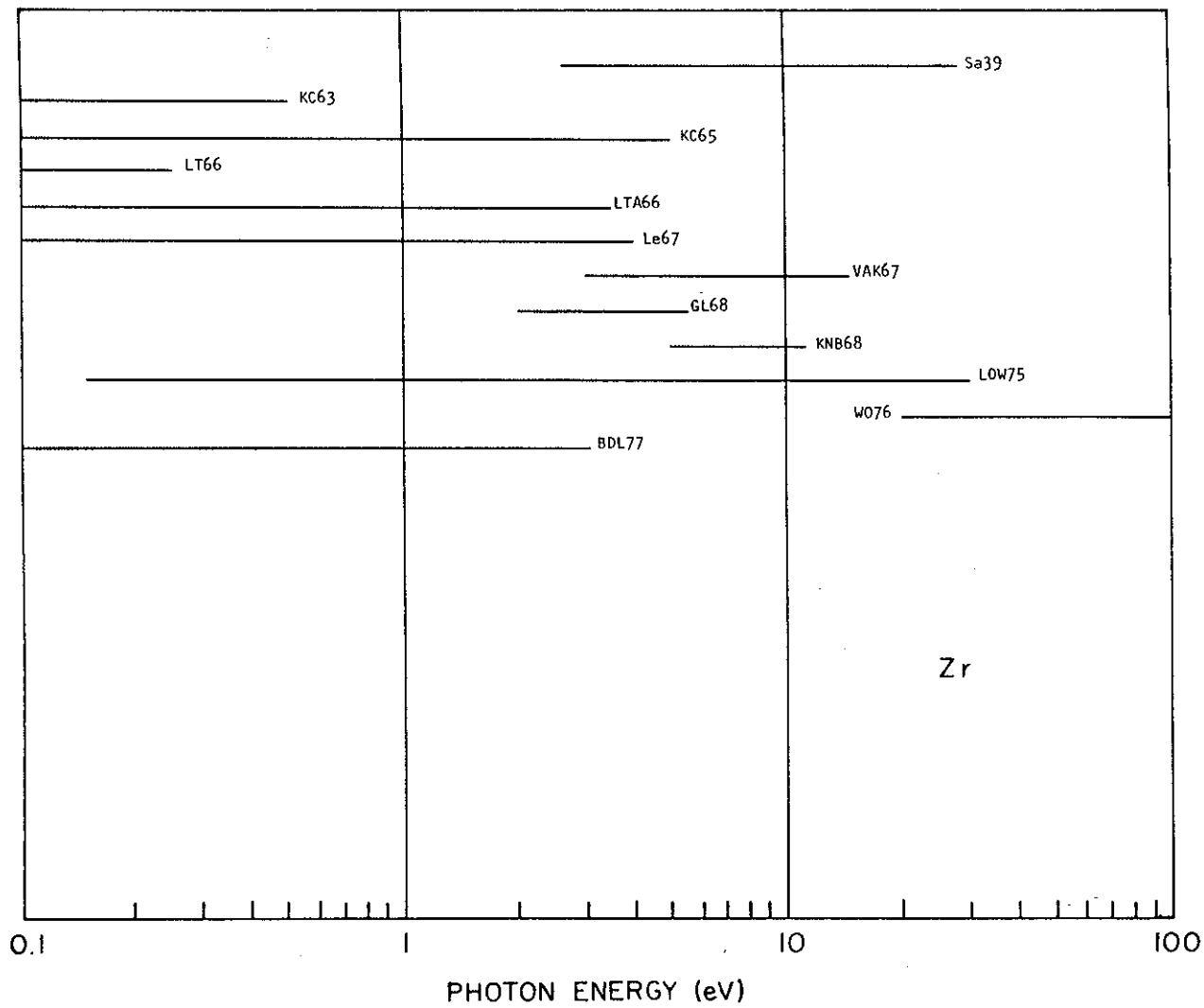


Fig. 38 Survey of available data for Zr

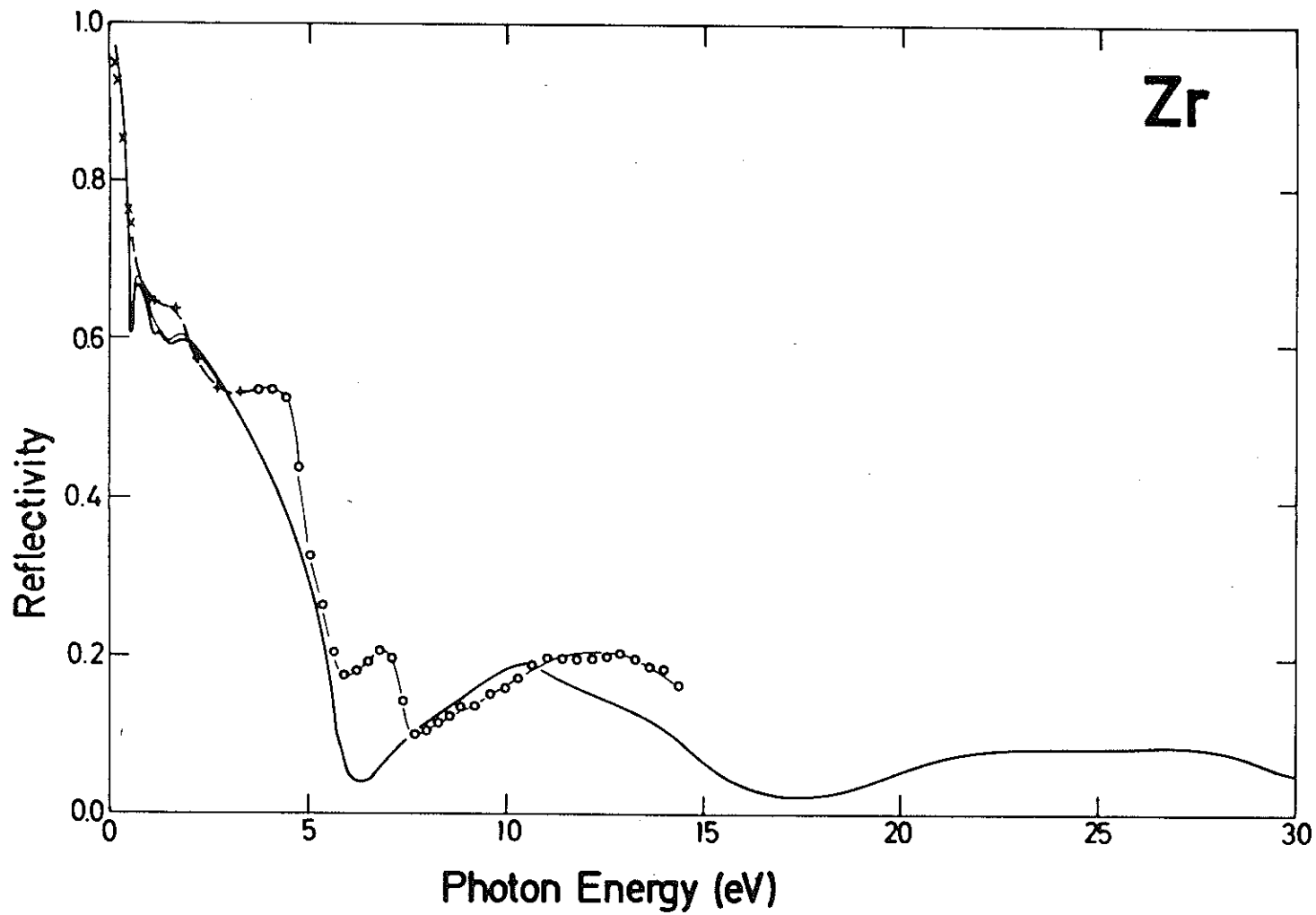


Fig. 39

Reflectivity of Zr. — LOW75; thin solid line denotes $R(E)$ for single crystal, $\vec{E} \perp \hat{c}$ by LOW (unpub); -o- VAK67; xxx KC63; +++ KNB68.

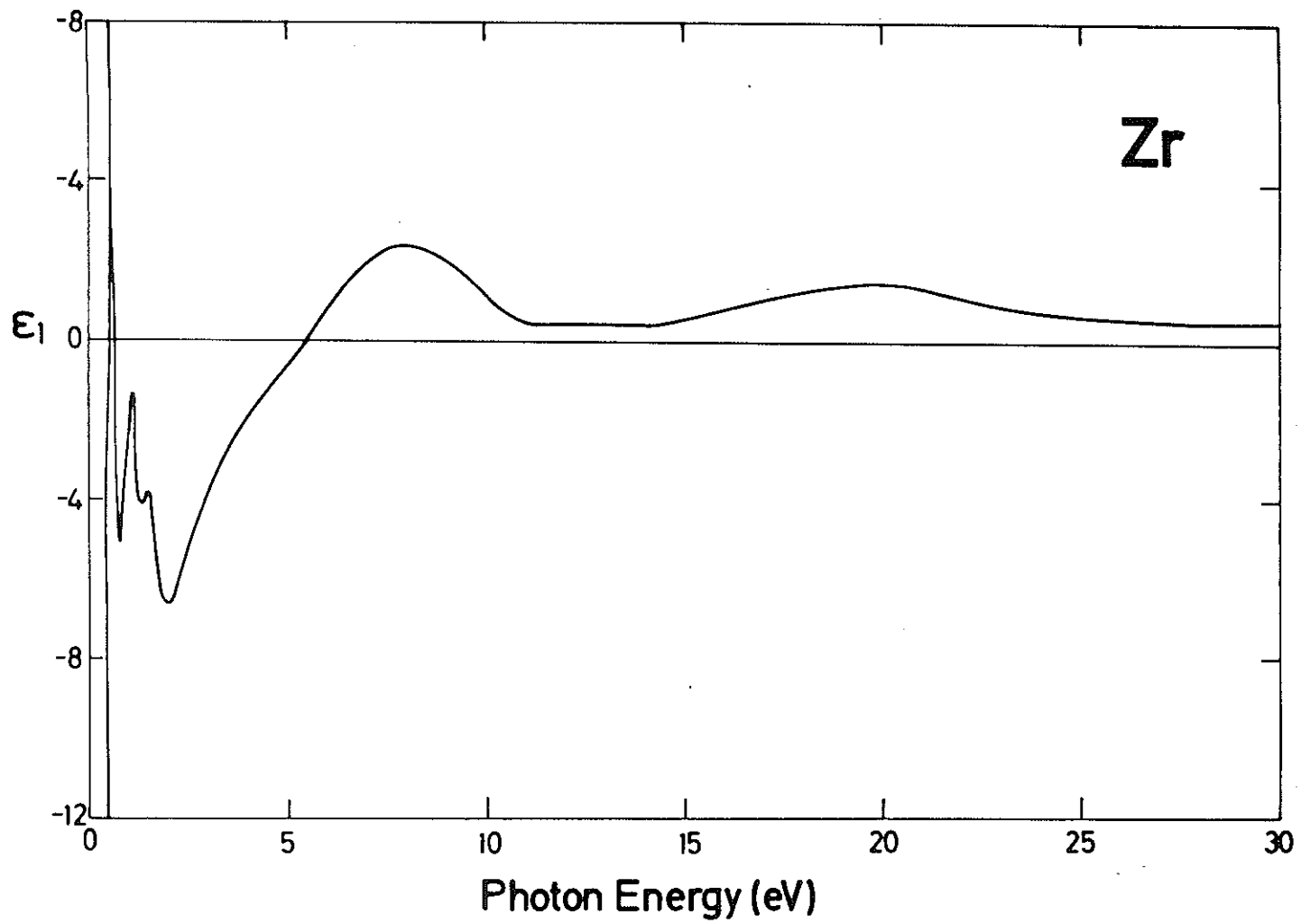


Fig. 40a ϵ_1 for polycrystalline Zr reported by LOW75.

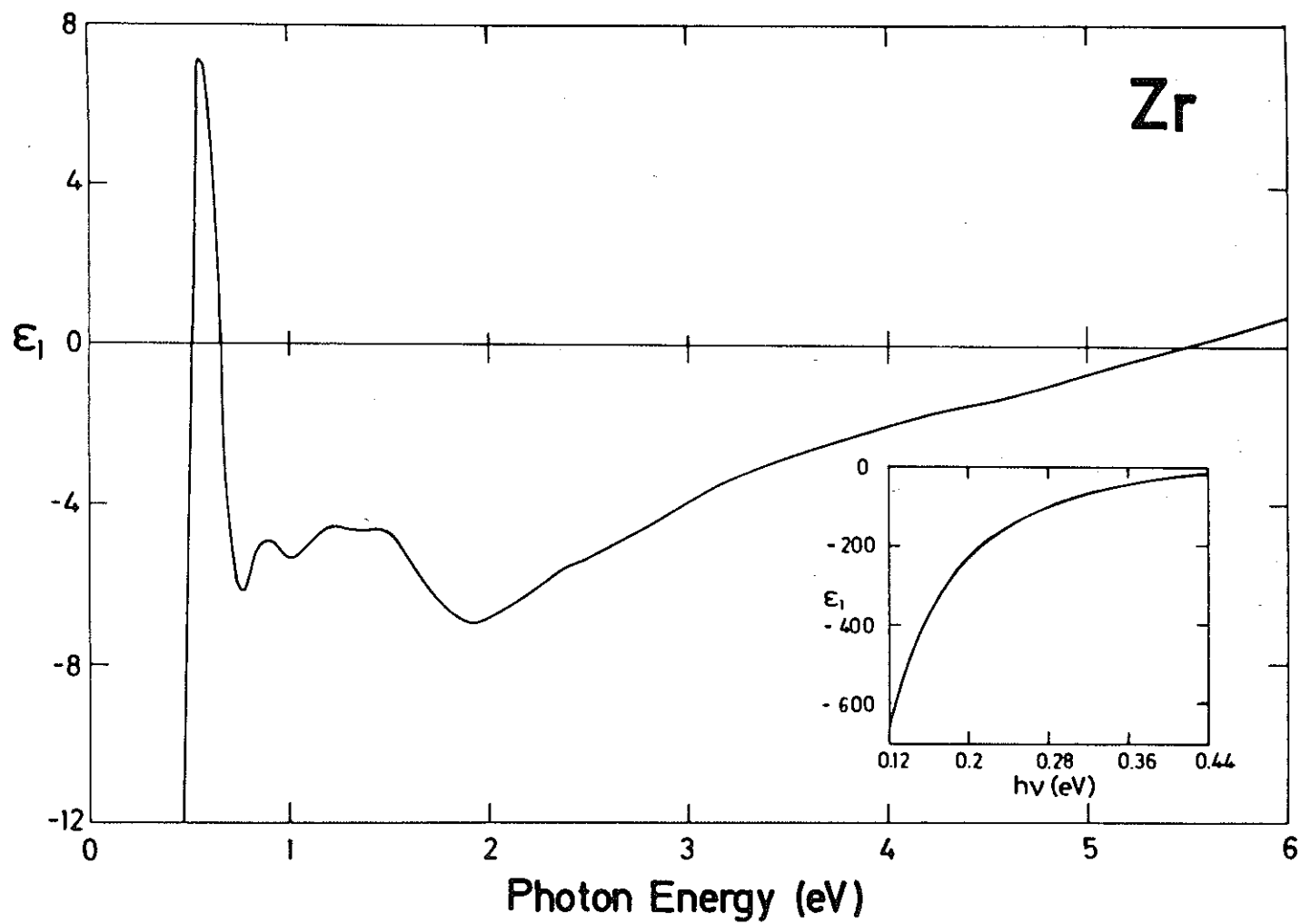


Fig. 40b ϵ_1 for Zr. LOW (unpub) for single crystal Zr with $\vec{E} \perp \vec{c}$.

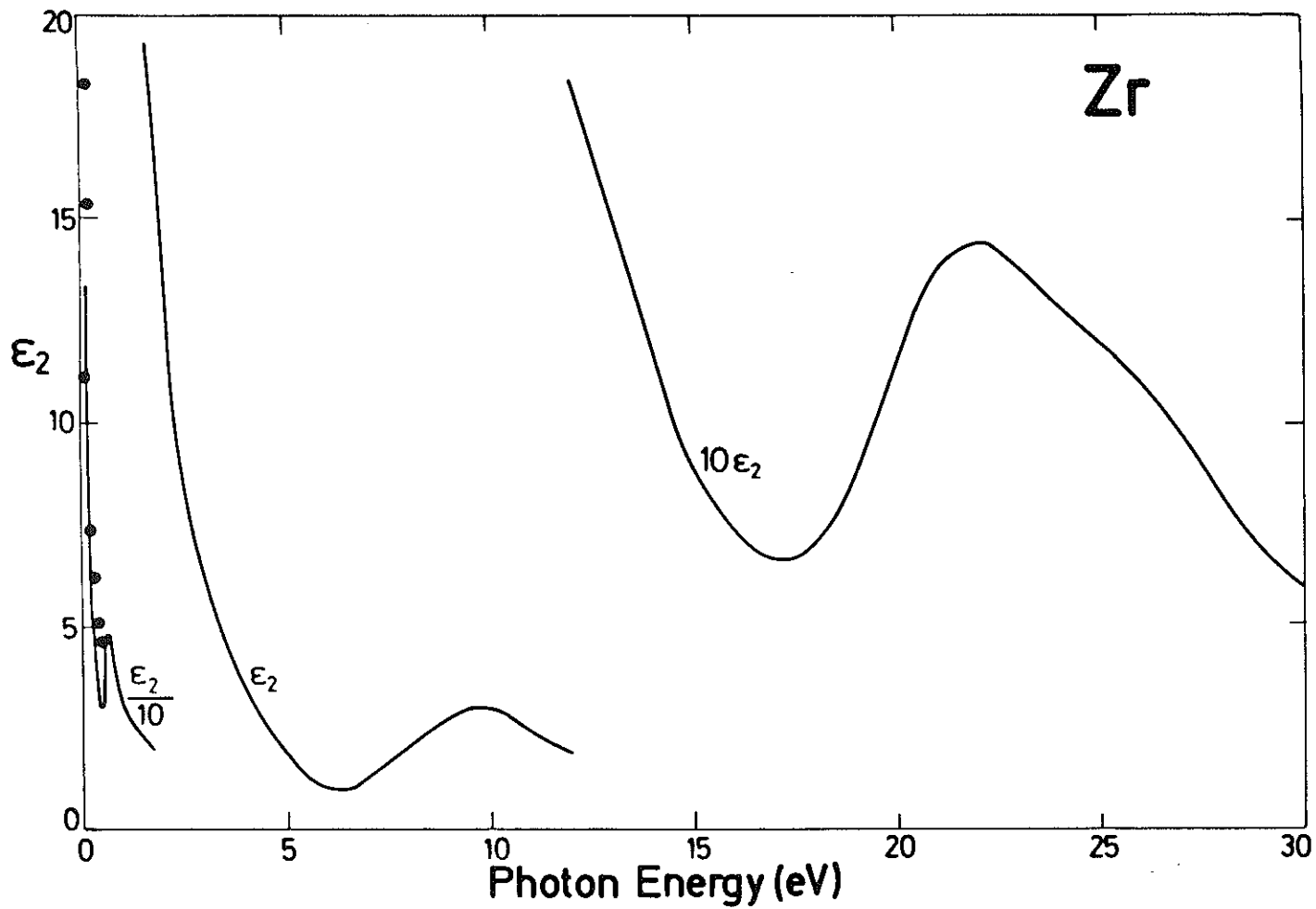


Fig. 41a ϵ_2 for polycrystalline Zr. — LOW75; ●●● KC63.

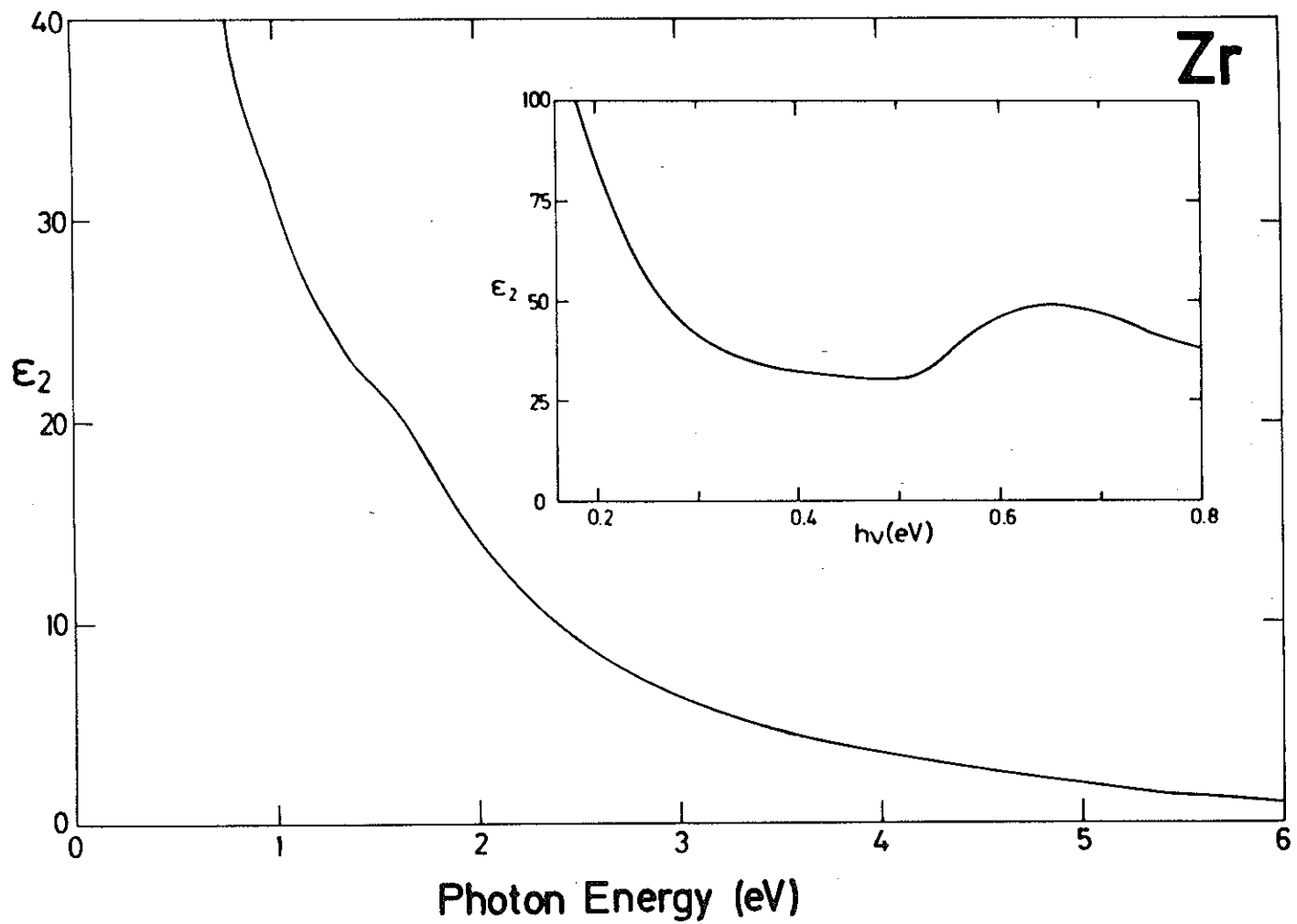


Fig. 41b ϵ_2 for Zr. LOW (unpub) for single crystal Zr with $\vec{k} \perp c$.

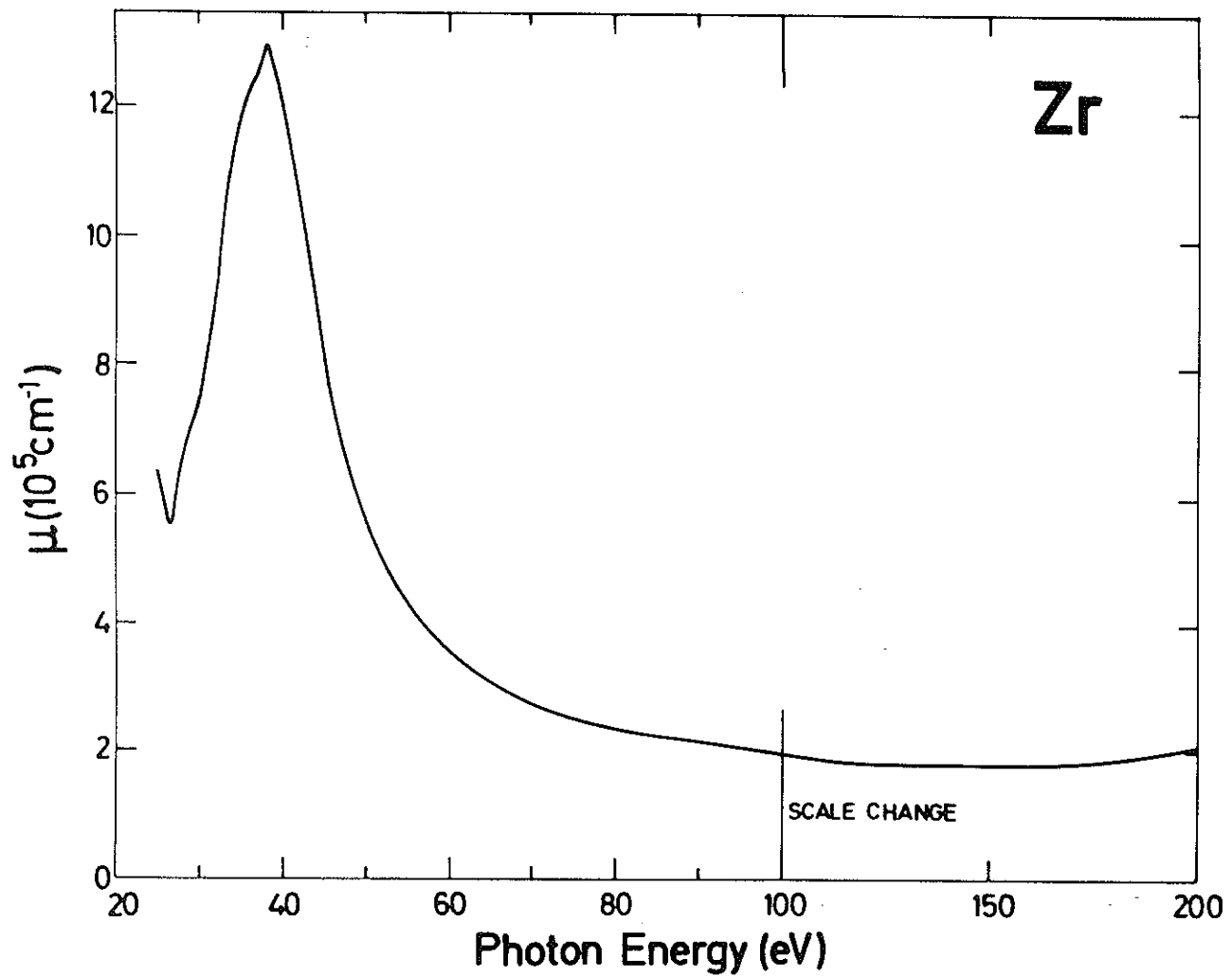


Fig. 42 Absorption coefficient for Zr reported by W076.

Zirconium

polycrystalline results as published in D.W. Lynch, C.G. Olson, and J.H. Weaver,
 Phys. Rev. B 11, 3617 (1975)

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\epsilon)$	$R(\phi=0)$
0.10	-812.14	360.46	6.18	1.76	0.00	.300
0.15	-376.96	132.86	3.37	1.30	0.00	.123
0.17	-269.76	90.19	2.71	1.16	0.00	.080
0.20	-196.79	66.55	2.34	1.08	0.00	.058
0.22	-154.08	56.06	2.22	1.05	0.00	.051
0.24	-121.81	49.19	2.19	1.05	0.00	.049
0.26	-96.52	45.07	2.24	1.06	0.00	.052
0.28	-76.58	42.87	2.36	1.09	0.01	.059
0.30	-60.81	42.57	2.59	1.14	0.01	.073
0.32	-49.05	43.24	2.86	1.20	0.01	.090
0.34	-41.04	43.66	3.07	1.24	0.01	.104
0.36	-35.74	42.96	3.17	1.26	0.01	.110
0.38	-31.69	40.74	3.16	1.26	0.02	.109
0.40	-27.38	37.54	3.09	1.24	0.02	.105
0.41	-24.86	35.67	3.05	1.24	0.02	.102
0.42	-21.99	33.98	3.04	1.23	0.02	.101
0.43	-18.89	32.64	3.07	1.24	0.02	.103
0.44	-15.75	31.66	3.13	1.25	0.03	.108
0.45	-12.65	31.01	3.23	1.27	0.03	.114
0.46	-9.60	30.67	3.36	1.30	0.03	.123
0.47	-6.63	30.63	3.51	1.33	0.03	.133
0.48	-3.76	30.92	3.70	1.36	0.03	.146
0.49	-1.02	31.68	3.92	1.40	0.03	.160
0.50	1.32	32.72	4.13	1.44	0.03	.175
0.52	4.70	35.20	4.48	1.50	0.03	.198
0.54	7.05	38.05	4.78	1.55	0.03	.217
0.56	8.13	41.19	5.01	1.58	0.02	.231
0.58	8.00	44.10	5.14	1.60	0.02	.240
0.60	6.59	46.56	5.18	1.61	0.02	.242
0.61	5.46	47.34	5.15	1.61	0.02	.240
0.62	4.30	47.74	5.11	1.60	0.02	.238
0.63	3.18	47.91	5.06	1.59	0.02	.235
0.64	2.05	47.93	5.00	1.58	0.02	.231
0.65	0.89	47.76	4.93	1.57	0.02	.227
0.66	-0.26	47.32	4.85	1.56	0.02	.221
0.68	-1.97	45.95	4.69	1.53	0.02	.211
0.70	-3.18	44.34	4.54	1.51	0.02	.202
0.72	-3.87	42.68	4.41	1.49	0.02	.193
0.74	-4.34	41.19	4.31	1.47	0.02	.186
0.76	-4.65	39.76	4.21	1.45	0.02	.180
0.78	-4.76	38.45	4.12	1.44	0.03	.174
0.80	-5.10	37.23	4.03	1.42	0.03	.168
0.82	-5.09	35.79	3.94	1.40	0.03	.162
0.84	-4.99	34.48	3.86	1.39	0.03	.157
0.86	-4.50	33.25	3.81	1.38	0.03	.153
0.88	-4.14	32.40	3.78	1.37	0.03	.151
0.90	-3.79	31.58	3.74	1.37	0.03	.149
0.92	-3.41	30.86	3.72	1.36	0.03	.147
0.94	-3.03	30.26	3.70	1.36	0.03	.146

Zr

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\bar{\epsilon})$	$R(\phi=0)$
0.96	-2.71	29.76	3.69	1.36	0.03	.145
0.98	-2.44	29.32	3.67	1.36	0.03	.144
1.00	-2.19	28.91	3.66	1.35	0.03	.143
1.02	-1.92	28.56	3.65	1.35	0.03	.143
1.04	-1.69	28.29	3.65	1.35	0.04	.142
1.06	-1.47	28.10	3.65	1.35	0.04	.142
1.08	-1.38	28.02	3.65	1.35	0.04	.142
1.10	-1.32	27.95	3.65	1.35	0.04	.142
1.12	-1.43	27.95	3.64	1.35	0.04	.142
1.14	-1.65	27.88	3.62	1.35	0.04	.141
1.16	-1.91	27.74	3.60	1.34	0.04	.139
1.18	-2.19	27.57	3.57	1.34	0.04	.137
1.20	-2.57	27.39	3.53	1.33	0.04	.134
1.22	-3.02	27.07	3.48	1.32	0.04	.131
1.24	-3.45	26.62	3.42	1.31	0.04	.127
1.26	-3.75	26.05	3.36	1.30	0.04	.123
1.28	-3.96	25.46	3.30	1.28	0.04	.119
1.30	-4.07	24.88	3.25	1.27	0.04	.116
1.32	-4.10	24.33	3.21	1.27	0.04	.112
1.34	-4.05	23.84	3.17	1.26	0.04	.110
1.36	-4.01	23.43	3.14	1.25	0.04	.108
1.38	-3.90	23.06	3.12	1.25	0.04	.107
1.40	-3.83	22.79	3.10	1.25	0.04	.106
1.42	-3.81	22.57	3.09	1.24	0.04	.105
1.44	-3.82	22.34	3.07	1.24	0.04	.103
1.46	-3.83	22.13	3.05	1.24	0.04	.102
1.48	-3.85	21.96	3.04	1.23	0.04	.101
1.50	-3.92	21.82	3.02	1.23	0.04	.100
1.52	-4.06	21.69	3.00	1.22	0.04	.099
1.54	-4.24	21.53	2.98	1.22	0.04	.097
1.56	-4.43	21.33	2.95	1.21	0.04	.095
1.58	-4.63	21.10	2.91	1.21	0.05	.093
1.60	-4.83	20.85	2.88	1.20	0.05	.091
1.62	-5.03	20.59	2.84	1.19	0.05	.089
1.64	-5.23	20.30	2.80	1.18	0.05	.086
1.66	-5.43	19.99	2.76	1.18	0.05	.083
1.68	-5.60	19.66	2.72	1.17	0.05	.081
1.70	-5.76	19.32	2.68	1.16	0.05	.078
1.72	-5.90	18.98	2.64	1.15	0.05	.076
1.74	-6.02	18.63	2.60	1.14	0.05	.073
1.76	-6.11	18.23	2.56	1.13	0.05	.071
1.78	-6.22	17.95	2.53	1.12	0.05	.069
1.80	-6.31	17.61	2.49	1.12	0.05	.067
1.85	-6.49	16.76	2.40	1.09	0.05	.061
1.90	-6.59	15.92	2.31	1.07	0.05	.056
1.95	-6.63	15.12	2.22	1.05	0.06	.051
2.00	-6.64	14.36	2.14	1.03	0.06	.047
2.05	-6.60	13.61	2.06	1.02	0.06	.043
2.10	-6.51	12.89	1.99	1.00	0.06	.040
2.15	-6.36	12.22	1.93	0.98	0.06	.036
2.20	-6.17	11.62	1.87	0.97	0.07	.034
2.25	-5.97	11.09	1.82	0.95	0.07	.032
2.30	-5.76	10.64	1.78	0.94	0.07	.030
2.35	-5.59	10.24	1.74	0.93	0.08	.029
2.40	-5.45	9.86	1.71	0.92	0.08	.027
2.45	-5.34	9.49	1.67	0.91	0.08	.026
2.50	-5.24	9.12	1.62	0.90	0.08	.024

Zr

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\bar{\epsilon})$	$R(\phi=0)$
2.55	-5.13	8.76	1.58	0.89	0.09	.023
2.60	-5.03	8.39	1.54	0.88	0.09	.022
2.65	-4.91	8.03	1.50	0.87	0.09	.020
2.70	-4.76	7.69	1.46	0.86	0.09	.019
2.75	-4.61	7.37	1.43	0.85	0.10	.018
2.80	-4.45	7.08	1.40	0.84	0.10	.018
2.85	-4.30	6.80	1.37	0.83	0.11	.017
2.90	-4.13	6.54	1.34	0.82	0.11	.016
2.95	-3.97	6.31	1.32	0.81	0.11	.016
3.00	-3.81	6.11	1.30	0.81	0.12	.016
3.10	-3.55	5.74	1.26	0.80	0.13	.015
3.20	-3.32	5.40	1.23	0.78	0.13	.014
3.30	-3.11	5.08	1.19	0.77	0.14	.014
3.40	-2.91	4.79	1.16	0.76	0.15	.013
3.50	-2.73	4.52	1.13	0.75	0.16	.013
3.60	-2.56	4.26	1.10	0.74	0.17	.013
3.70	-2.40	4.02	1.07	0.73	0.18	.013
3.80	-2.25	3.79	1.04	0.72	0.20	.012
3.90	-2.10	3.57	1.01	0.71	0.21	.012
4.00	-1.95	3.36	0.98	0.70	0.22	.012
4.10	-1.81	3.17	0.96	0.69	0.24	.012
4.20	-1.67	2.99	0.94	0.68	0.25	.013
4.30	-1.55	2.82	0.91	0.68	0.27	.013
4.40	-1.42	2.65	0.89	0.67	0.29	.013
4.50	-1.30	2.48	0.87	0.66	0.32	.013
4.60	-1.17	2.33	0.85	0.65	0.34	.014
4.70	-1.05	2.19	0.83	0.64	0.37	.014
4.80	-0.93	2.04	0.81	0.64	0.41	.014
4.90	-0.80	1.90	0.79	0.63	0.45	.015
5.00	-0.67	1.77	0.78	0.63	0.49	.015
5.10	-0.54	1.66	0.78	0.62	0.54	.015
5.20	-0.42	1.54	0.77	0.62	0.60	.016
5.30	-0.28	1.42	0.76	0.62	0.68	.016
5.40	-0.14	1.31	0.77	0.62	0.75	.016
5.50	0.00	1.22	0.78	0.62	0.82	.015
5.60	0.14	1.14	0.80	0.63	0.86	.014
5.70	0.29	1.06	0.83	0.65	0.88	.014
5.80	0.43	0.99	0.87	0.66	0.85	.013
5.90	0.63	0.92	0.93	0.68	0.74	.013
6.00	0.80	0.90	1.00	0.71	0.62	.012
6.10	0.95	0.90	1.06	0.73	0.53	.013
6.20	1.08	0.90	1.11	0.75	0.46	.013
6.30	1.23	0.90	1.17	0.77	0.39	.014
6.40	1.36	0.92	1.23	0.78	0.34	.014
6.50	1.49	0.95	1.28	0.80	0.30	.015
6.60	1.62	0.98	1.33	0.81	0.27	.016
6.70	1.75	1.03	1.37	0.83	0.25	.017
6.80	1.86	1.09	1.42	0.84	0.23	.018
6.90	1.97	1.17	1.46	0.85	0.22	.019
7.00	2.05	1.26	1.49	0.86	0.22	.020
7.20	2.17	1.43	1.54	0.88	0.21	.022
7.40	2.25	1.59	1.58	0.89	0.21	.023
7.60	2.30	1.74	1.61	0.90	0.21	.024
7.80	2.34	1.88	1.63	0.90	0.21	.025
8.00	2.37	2.04	1.66	0.91	0.21	.026
8.20	2.36	2.20	1.67	0.91	0.21	.026
8.40	2.32	2.37	1.68	0.92	0.22	.026

Zr

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\epsilon)$	$R(\phi=0)$
8.60	2.24	2.53	1.68	0.92	0.22	.026
8.80	2.14	2.64	1.66	0.91	0.23	.026
9.00	2.03	2.77	1.65	0.91	0.23	.025
9.20	1.88	2.89	1.63	0.90	0.24	.025
9.40	1.71	2.96	1.60	0.89	0.25	.024
9.60	1.53	3.02	1.57	0.89	0.26	.023
9.80	1.33	3.03	1.52	0.87	0.28	.021
10.00	1.12	3.02	1.47	0.86	0.29	.020
10.20	0.91	2.96	1.42	0.84	0.31	.018
10.40	0.71	2.84	1.35	0.82	0.33	.016
10.50	0.63	2.77	1.32	0.81	0.34	.016
10.60	0.56	2.67	1.28	0.80	0.36	.015
10.80	0.48	2.50	1.23	0.78	0.39	.014
11.00	0.44	2.35	1.19	0.77	0.41	.014
11.20	0.42	2.22	1.16	0.76	0.43	.013
11.40	0.41	2.10	1.13	0.75	0.46	.013
11.60	0.41	2.00	1.11	0.74	0.48	.013
11.80	0.41	1.91	1.09	0.74	0.50	.013
12.00	0.43	1.84	1.08	0.73	0.52	.013
12.20	0.42	1.78	1.06	0.73	0.53	.013
12.40	0.42	1.72	1.05	0.72	0.55	.012
12.60	0.41	1.65	1.03	0.72	0.57	.012
12.80	0.41	1.59	1.01	0.71	0.59	.012
13.00	0.40	1.53	1.00	0.71	0.61	.012
13.20	0.40	1.46	0.98	0.70	0.64	.012
13.40	0.40	1.40	0.96	0.69	0.66	.012
13.60	0.40	1.33	0.95	0.69	0.69	.013
13.80	0.41	1.27	0.93	0.68	0.71	.013
14.00	0.42	1.20	0.92	0.68	0.74	.013
14.20	0.43	1.13	0.91	0.67	0.77	.013
14.40	0.45	1.05	0.89	0.67	0.80	.013
14.60	0.49	0.98	0.89	0.67	0.82	.013
14.80	0.54	0.92	0.90	0.67	0.81	.013
15.00	0.60	0.87	0.91	0.67	0.78	.013
15.20	0.64	0.84	0.92	0.68	0.75	.013
15.40	0.69	0.81	0.94	0.68	0.72	.013
15.60	0.73	0.79	0.95	0.69	0.68	.013
15.80	0.77	0.76	0.96	0.69	0.65	.012
16.00	0.81	0.74	0.98	0.70	0.61	.012
16.20	0.85	0.71	0.99	0.70	0.58	.012
16.40	0.90	0.70	1.01	0.71	0.54	.012
16.60	0.94	0.68	1.02	0.72	0.51	.012
16.80	0.99	0.66	1.04	0.72	0.47	.012
17.00	1.04	0.65	1.06	0.73	0.43	.013
17.20	1.09	0.65	1.09	0.74	0.40	.013
17.40	1.14	0.65	1.11	0.74	0.38	.013
17.60	1.19	0.66	1.13	0.75	0.36	.013
17.80	1.23	0.67	1.15	0.76	0.34	.013
18.00	1.28	0.70	1.17	0.76	0.33	.014
18.20	1.32	0.72	1.19	0.77	0.32	.014
18.40	1.36	0.75	1.21	0.78	0.31	.014
18.60	1.40	0.78	1.23	0.78	0.30	.014
18.80	1.43	0.82	1.24	0.79	0.30	.014
19.00	1.46	0.87	1.26	0.79	0.30	.015
19.20	1.48	0.92	1.27	0.80	0.30	.015
19.40	1.50	0.97	1.28	0.80	0.30	.015
19.60	1.51	1.02	1.29	0.80	0.31	.015

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\epsilon)$	$R(\phi=0)$
19.80	1.51	1.08	1.30	0.81	0.31	.015
20.00	1.50	1.14	1.30	0.81	0.32	.015
20.20	1.48	1.20	1.30	0.81	0.33	.015
20.40	1.45	1.26	1.30	0.81	0.34	.015
20.60	1.42	1.30	1.29	0.80	0.35	.015
20.80	1.37	1.35	1.28	0.80	0.36	.015
21.00	1.32	1.38	1.27	0.80	0.38	.015
21.20	1.27	1.40	1.26	0.79	0.39	.015
21.40	1.22	1.43	1.24	0.79	0.40	.014
21.60	1.17	1.44	1.23	0.78	0.42	.014
21.80	1.12	1.44	1.21	0.78	0.43	.014
22.00	1.07	1.44	1.20	0.77	0.45	.014
22.20	1.02	1.43	1.18	0.77	0.46	.014
22.40	0.98	1.42	1.16	0.76	0.48	.013
22.60	0.94	1.41	1.15	0.76	0.49	.013
22.80	0.90	1.40	1.13	0.75	0.51	.013
23.00	0.87	1.38	1.12	0.75	0.52	.013
23.20	0.84	1.36	1.10	0.74	0.53	.013
23.40	0.81	1.34	1.09	0.74	0.55	.013
23.60	0.78	1.32	1.08	0.73	0.56	.013
23.80	0.76	1.30	1.06	0.73	0.57	.013
24.00	0.74	1.28	1.05	0.73	0.59	.013
24.20	0.72	1.26	1.04	0.72	0.60	.012
24.40	0.70	1.24	1.03	0.72	0.61	.012
24.60	0.68	1.22	1.02	0.71	0.63	.012
24.80	0.66	1.21	1.01	0.71	0.64	.012
25.00	0.64	1.19	1.00	0.71	0.65	.012
25.20	0.62	1.17	0.99	0.70	0.67	.012
25.40	0.61	1.15	0.98	0.70	0.68	.012
25.60	0.59	1.13	0.97	0.69	0.70	.012
25.80	0.57	1.11	0.95	0.69	0.71	.012
26.00	0.56	1.10	0.95	0.69	0.72	.013
26.20	0.54	1.08	0.93	0.68	0.74	.013
26.40	0.52	1.06	0.92	0.68	0.76	.013
26.60	0.50	1.03	0.91	0.67	0.79	.013
26.80	0.48	1.01	0.89	0.67	0.81	.013
27.00	0.46	0.98	0.88	0.66	0.84	.013
27.20	0.45	0.94	0.86	0.66	0.87	.013
27.40	0.44	0.90	0.85	0.65	0.90	.014
27.60	0.44	0.87	0.84	0.65	0.92	.014
27.80	0.44	0.83	0.83	0.64	0.94	.014
28.00	0.45	0.80	0.83	0.64	0.95	.014
28.20	0.45	0.78	0.82	0.64	0.96	.014
28.40	0.46	0.75	0.82	0.64	0.97	.014
28.60	0.47	0.73	0.82	0.64	0.97	.014
28.80	0.48	0.70	0.82	0.64	0.97	.014
29.00	0.49	0.68	0.81	0.64	0.97	.014
29.20	0.50	0.66	0.81	0.64	0.96	.014
29.40	0.50	0.64	0.81	0.64	0.97	.014
29.60	0.52	0.62	0.82	0.64	0.95	.014
29.80	0.53	0.60	0.82	0.64	0.94	.014
30.00	0.55	0.59	0.82	0.64	0.91	.014

Zirconium single crystal with $\vec{E} \perp \hat{c}$

D.W. Lynch, C.G. Olson, and J.H. Weaver (unpub)

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\bar{\epsilon})$	$R(\phi=0)$
0.51	-1.68	31.00	3.83	4.05	0.03	.618
0.52	1.01	31.92	4.06	3.93	0.03	.609
0.53	3.43	33.40	4.30	3.88	0.03	.606
0.54	5.37	35.38	4.54	3.90	0.03	.609
0.56	7.12	39.72	4.87	4.08	0.02	.623
0.58	6.94	43.39	5.04	4.30	0.02	.638
0.60	5.81	45.78	5.10	4.49	0.02	.649
0.62	4.19	47.37	5.09	4.66	0.02	.658
0.64	2.28	46.19	5.03	4.79	0.02	.665
0.66	0.21	48.32	4.93	4.90	0.02	.671
0.68	-1.80	47.74	4.79	4.98	0.02	.675
0.70	-3.57	46.59	4.65	5.01	0.02	.678
0.72	-4.91	45.00	4.49	5.01	0.02	.679
0.74	-5.83	43.19	4.34	4.97	0.02	.678
0.76	-6.17	41.31	4.22	4.90	0.02	.674
0.78	-6.16	39.65	4.12	4.81	0.02	.670
0.80	-5.82	38.24	4.05	4.72	0.03	.665
0.82	-5.46	37.19	4.01	4.64	0.03	.660
0.84	-5.14	36.38	3.98	4.58	0.03	.656
0.86	-5.00	35.73	3.94	4.53	0.03	.653
0.88	-4.93	35.09	3.91	4.49	0.03	.651
0.90	-4.93	34.46	3.87	4.46	0.03	.649
0.92	-4.94	33.84	3.82	4.42	0.03	.647
0.94	-4.99	33.24	3.78	4.39	0.03	.645
0.96	-5.11	32.64	3.74	4.37	0.03	.644
0.98	-5.27	31.97	3.68	4.34	0.03	.643
1.00	-5.32	31.21	3.63	4.30	0.03	.641
1.05	-5.18	29.53	3.52	4.19	0.03	.634
1.10	-4.95	28.14	3.44	4.09	0.03	.627
1.15	-4.75	26.99	3.37	4.01	0.04	.621
1.20	-4.62	26.01	3.30	3.94	0.04	.616
1.25	-4.58	25.14	3.24	3.88	0.04	.612
1.30	-4.65	24.30	3.17	3.83	0.04	.609
1.35	-4.66	23.44	3.10	3.78	0.04	.605
1.40	-4.63	22.68	3.04	3.73	0.04	.602
1.45	-4.58	22.06	3.00	3.68	0.04	.598
1.50	-4.70	21.59	2.95	3.66	0.04	.597
1.55	-4.96	21.13	2.89	3.65	0.04	.598
1.60	-5.39	20.60	2.82	3.65	0.05	.600
1.65	-5.81	19.90	2.73	3.64	0.05	.602
1.70	-6.18	19.13	2.64	3.63	0.05	.604
1.75	-6.47	18.30	2.54	3.60	0.05	.605
1.80	-6.72	17.45	2.45	3.57	0.05	.606
1.85	-6.90	16.56	2.35	3.52	0.05	.606
1.90	-6.95	15.66	2.26	3.47	0.05	.605
1.95	-6.87	14.83	2.18	3.41	0.06	.603
2.00	-6.77	14.11	2.11	3.35	0.06	.600
2.05	-6.66	13.44	2.04	3.29	0.06	.597
2.10	-6.56	12.79	1.98	3.24	0.06	.595

Zr $\bar{\epsilon}$ \hat{c}

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\bar{\epsilon})$	$R(\phi=0)$
2.15	-6.41	12.17	1.92	3.18	0.06	.591
2.20	-6.23	11.61	1.86	3.11	0.07	.587
2.25	-6.02	11.10	1.82	3.05	0.07	.583
2.30	-5.83	10.66	1.78	3.00	0.07	.578
2.35	-5.66	10.27	1.74	2.95	0.07	.574
2.40	-5.53	9.90	1.71	2.90	0.08	.571
2.45	-5.41	9.55	1.67	2.86	0.08	.568
2.50	-5.34	9.19	1.63	2.83	0.08	.566
2.55	-5.23	8.81	1.58	2.78	0.08	.564
2.60	-5.12	8.43	1.54	2.74	0.09	.562
2.65	-4.97	8.08	1.50	2.69	0.09	.558
2.70	-4.83	7.75	1.47	2.64	0.09	.554
2.75	-4.67	7.44	1.43	2.59	0.10	.550
2.90	-4.20	6.64	1.35	2.46	0.11	.535
2.95	-4.05	6.41	1.33	2.41	0.11	.530
3.00	-3.90	6.20	1.31	2.37	0.12	.524
3.10	-3.63	5.83	1.27	2.29	0.12	.514
3.20	-3.40	5.48	1.24	2.22	0.13	.504
3.30	-3.18	5.17	1.20	2.15	0.14	.495
3.40	-2.99	4.88	1.17	2.09	0.15	.486
3.50	-2.81	4.60	1.14	2.02	0.16	.478
3.60	-2.64	4.34	1.10	1.96	0.17	.469
3.70	-2.48	4.10	1.07	1.91	0.18	.460
3.80	-2.32	3.86	1.05	1.85	0.19	.451
3.90	-2.17	3.64	1.02	1.79	0.20	.442
4.00	-2.03	3.44	0.99	1.73	0.22	.433
4.10	-1.88	3.24	0.97	1.68	0.23	.423
4.20	-1.75	3.06	0.94	1.62	0.25	.412
4.30	-1.62	2.88	0.92	1.57	0.26	.403
4.40	-1.50	2.71	0.89	1.52	0.28	.392
4.50	-1.37	2.55	0.87	1.46	0.30	.380
4.60	-1.24	2.39	0.85	1.40	0.33	.368
4.70	-1.12	2.24	0.83	1.35	0.36	.354
4.80	-0.99	2.09	0.81	1.29	0.39	.340
4.90	-0.87	1.95	0.80	1.23	0.43	.324
5.00	-0.74	1.82	0.78	1.16	0.47	.306
5.10	-0.61	1.70	0.77	1.10	0.52	.286
5.20	-0.48	1.58	0.77	1.03	0.58	.264
5.30	-0.34	1.46	0.76	0.96	0.65	.239
5.40	-0.20	1.36	0.77	0.89	0.72	.211
5.50	-0.05	1.26	0.78	0.81	0.79	.181
5.60	0.09	1.18	0.80	0.74	0.84	.150
5.70	0.24	1.10	0.83	0.67	0.87	.121
5.80	0.40	1.03	0.87	0.59	0.85	.093
5.90	0.56	0.97	0.92	0.53	0.77	.070
6.00	0.73	0.93	0.98	0.47	0.66	.053
6.10	0.89	0.92	1.04	0.44	0.56	.045
6.20	1.04	0.92	1.10	0.42	0.48	.041
6.30	1.18	0.92	1.16	0.40	0.41	.040
6.40	1.31	0.93	1.21	0.39	0.36	.040
6.50	1.45	0.96	1.26	0.38	0.32	.043
6.60	1.58	0.99	1.31	0.38	0.29	.047
6.70	1.70	1.04	1.36	0.38	0.26	.051
6.80	1.82	1.10	1.41	0.39	0.24	.057
6.90	1.93	1.17	1.45	0.41	0.23	.063
7.00	2.01	1.25	1.48	0.42	0.22	.068
7.20	2.15	1.41	1.54	0.46	0.21	.079

Zr $\bar{\epsilon}$ 1 $\bar{\epsilon}$

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\bar{\epsilon})$	$R(\phi=0)$
7.40	2.24	1.57	1.58	0.50	0.21	.089
7.60	2.30	1.72	1.61	0.53	0.21	.097
7.80	2.35	1.87	1.64	0.57	0.21	.105
8.00	2.38	2.03	1.66	0.61	0.21	.113
8.20	2.38	2.19	1.68	0.65	0.21	.121
8.40	2.35	2.36	1.68	0.70	0.21	.129
8.60	2.28	2.51	1.68	0.75	0.22	.136
8.80	2.19	2.66	1.68	0.79	0.22	.144
9.00	2.08	2.79	1.67	0.84	0.23	.150
9.20	1.94	2.91	1.65	0.88	0.24	.158
9.40	1.77	3.00	1.62	0.93	0.25	.164
10.00	1.18	3.08	1.50	1.03	0.28	.183
10.20	0.96	3.03	1.44	1.05	0.30	.187
10.40	0.75	2.93	1.37	1.07	0.32	.191
10.50	0.66	2.85	1.34	1.06	0.33	.191
10.60	0.59	2.76	1.31	1.06	0.35	.190
10.80	0.50	2.59	1.25	1.03	0.37	.186
11.00	0.45	2.44	1.21	1.01	0.40	.181
11.20	0.42	2.30	1.17	0.98	0.42	.175
11.40	0.41	2.18	1.15	0.95	0.44	.169
11.60	0.40	2.08	1.12	0.93	0.46	.163
11.80	0.41	1.99	1.10	0.90	0.48	.157
12.00	0.41	1.91	1.09	0.88	0.50	.152
12.20	0.41	1.85	1.07	0.86	0.52	.148
12.40	0.40	1.78	1.06	0.84	0.53	.145
12.60	0.39	1.72	1.04	0.83	0.55	.141
12.80	0.39	1.65	1.02	0.81	0.57	.137
13.00	0.38	1.59	1.00	0.79	0.60	.133
13.20	0.38	1.52	0.99	0.77	0.62	.130
13.40	0.38	1.45	0.97	0.75	0.64	.125
13.60	0.38	1.39	0.95	0.73	0.67	.120
13.80	0.38	1.32	0.94	0.70	0.70	.115
14.00	0.39	1.25	0.92	0.68	0.73	.109
14.20	0.40	1.17	0.91	0.65	0.76	.103
14.40	0.43	1.10	0.90	0.61	0.79	.094
14.60	0.46	1.03	0.89	0.58	0.81	.085
14.80	0.51	0.96	0.89	0.54	0.81	.075
15.00	0.56	0.91	0.90	0.51	0.79	.066
15.20	0.61	0.88	0.92	0.48	0.77	.058
15.40	0.66	0.84	0.93	0.45	0.74	.052
15.60	0.70	0.81	0.94	0.43	0.71	.047
15.80	0.74	0.79	0.95	0.41	0.68	.042
16.00	0.78	0.76	0.97	0.39	0.64	.037
16.20	0.82	0.73	0.98	0.37	0.60	.034
16.40	0.87	0.71	1.00	0.36	0.57	.030
16.60	0.91	0.70	1.01	0.34	0.53	.028
16.80	0.96	0.68	1.03	0.33	0.49	.026
17.00	1.01	0.67	1.05	0.32	0.46	.024
17.20	1.06	0.66	1.07	0.31	0.42	.023
17.40	1.11	0.66	1.10	0.30	0.39	.023
17.60	1.16	0.67	1.12	0.30	0.37	.024
17.80	1.21	0.68	1.14	0.30	0.35	.025
18.00	1.26	0.70	1.16	0.30	0.34	.026
18.20	1.31	0.72	1.18	0.30	0.32	.028
18.40	1.35	0.75	1.20	0.31	0.31	.030
18.60	1.39	0.78	1.22	0.32	0.31	.032
18.80	1.43	0.82	1.24	0.33	0.30	.035

Zr $\vec{E} \perp \hat{c}$

Energy (eV)	ϵ_1	ϵ_2	n	k	$\text{Im}(-1/\epsilon)$	$R(\phi=0)$
19.00	1.46	0.86	1.26	0.34	0.30	.038
19.20	1.49	0.91	1.27	0.36	0.30	.041
19.40	1.51	0.96	1.28	0.37	0.30	.044
19.60	1.52	1.02	1.29	0.39	0.30	.047
19.80	1.53	1.08	1.30	0.41	0.31	.051
20.00	1.52	1.14	1.31	0.43	0.31	.054
20.20	1.51	1.20	1.31	0.46	0.32	.058
20.40	1.48	1.25	1.31	0.48	0.33	.061
21.20	1.33	1.43	1.28	0.56	0.38	.073
21.40	1.27	1.45	1.27	0.57	0.39	.075
21.60	1.22	1.47	1.25	0.59	0.40	.077
21.80	1.16	1.48	1.23	0.60	0.42	.079
22.00	1.11	1.48	1.22	0.61	0.43	.080
22.20	1.07	1.48	1.20	0.62	0.44	.082
22.40	1.02	1.48	1.19	0.62	0.46	.083
22.60	0.98	1.47	1.17	0.63	0.47	.084
22.80	0.94	1.45	1.15	0.63	0.49	.084
23.00	0.90	1.44	1.14	0.63	0.50	.085
23.20	0.87	1.42	1.13	0.63	0.51	.085
23.40	0.83	1.41	1.11	0.63	0.53	.085
23.60	0.80	1.39	1.10	0.63	0.54	.085
23.80	0.78	1.37	1.08	0.63	0.55	.085
24.00	0.76	1.35	1.07	0.63	0.56	.085
24.20	0.73	1.33	1.06	0.63	0.58	.085
24.40	0.71	1.31	1.05	0.62	0.59	.085
24.60	0.69	1.29	1.04	0.62	0.60	.085
24.80	0.67	1.28	1.03	0.62	0.61	.085