

Authors	Energy Range (eV)	Technique	Temperature (K) RT unless specified	Sample				Data Presentation	Remarks Ta
				Film	X-tal	Bulk	Prep		
LFJ64	7.1-23.6	Ref1				x	Heat	R	heated in situ $\sim 10^{-9}$ Torr
AU66	$\sim 2.5-55$	Ref1	$\sim 2000$					$\text{Im}(\epsilon^{-1})$	energy loss spectroscopy at several temperatures
Ba66	0.6-2.6	Ellips				x	Ex	n,k	filaments at various T
LT66	0.06-0.25	Ellips				x	MP	$\epsilon_2/\lambda, \epsilon_1$	
Le67	0.1-4					x	MP	$\epsilon_2/\lambda$	data from LT66 and LTA66
LTA66	0.1-3.5					x	MP	$\epsilon_2/\lambda, \epsilon_1$	
JCF68	$\sim 78-506$	m- $\theta$		x			Ex	$\mu/\rho$	soft x-ray absorption with synchrotron radiation
JLM68	2.1-23.1					x	Heat	R,n,k, $\epsilon_1, \epsilon_2, \text{Im}(\epsilon^{-1})$	heated $\sim 2600$ K at $\sim 10^{-9}$ Torr
HRS69	30-600	Trans		x			Ex	$\mu$	optical absorption measurements with synchrotron radiation
BB74			1200-2600			x		$\epsilon_N$ at $\lambda = 6450 \text{ \AA}$	
WL074	0.1-35	Ref1	4.2 for $h\nu < 4.88 \text{ eV}$ RT for $h\nu > 4.88 \text{ eV}$			x	EP	A,R; KK: $\epsilon_1, \epsilon_2, \text{Im}(\epsilon^{-1}), \text{Im}(\epsilon+1)^{-1}$	absorptivity measured by calorimetry for $h\nu < 4.88 \text{ eV}$ , reflectivity for $h\nu > 4.88 \text{ eV}$ with synchrotron radiation, see also RCF80
Zho74			>1000					$\epsilon$	emissivity
KNN75	0.07-4.09	Ellips			x		EP	n,k, $\epsilon_1, \sigma$	(110) crystal

thors	Energy Range (eV)	Technique	Temperature (K) RT unless specified	Sample				Data Presentation	Remarks  Ta
				Film	X-tal	Bulk	Prep		
T76	0.5-5	Ellips	4.2			x	In	$\epsilon_2$ (interband)	heated to 2000 K in uhv
DL77	0.03-3.1	Ref1				x		R	also emissivity 400-850 K
TT77	0.5-5	Ellips	4.2-1100			x	In	$\epsilon_2$ (interband)	heated to 2000 K in uhv
CS79	0.32-5.6	Trans, Ref1		x			In	$\sigma$	uhv evaporation
C80	0.5-6.5	Trans, Ref1		x			Ex	n,k, $\sigma$	polycrystalline thin films, substrate T: 1275-1425 K

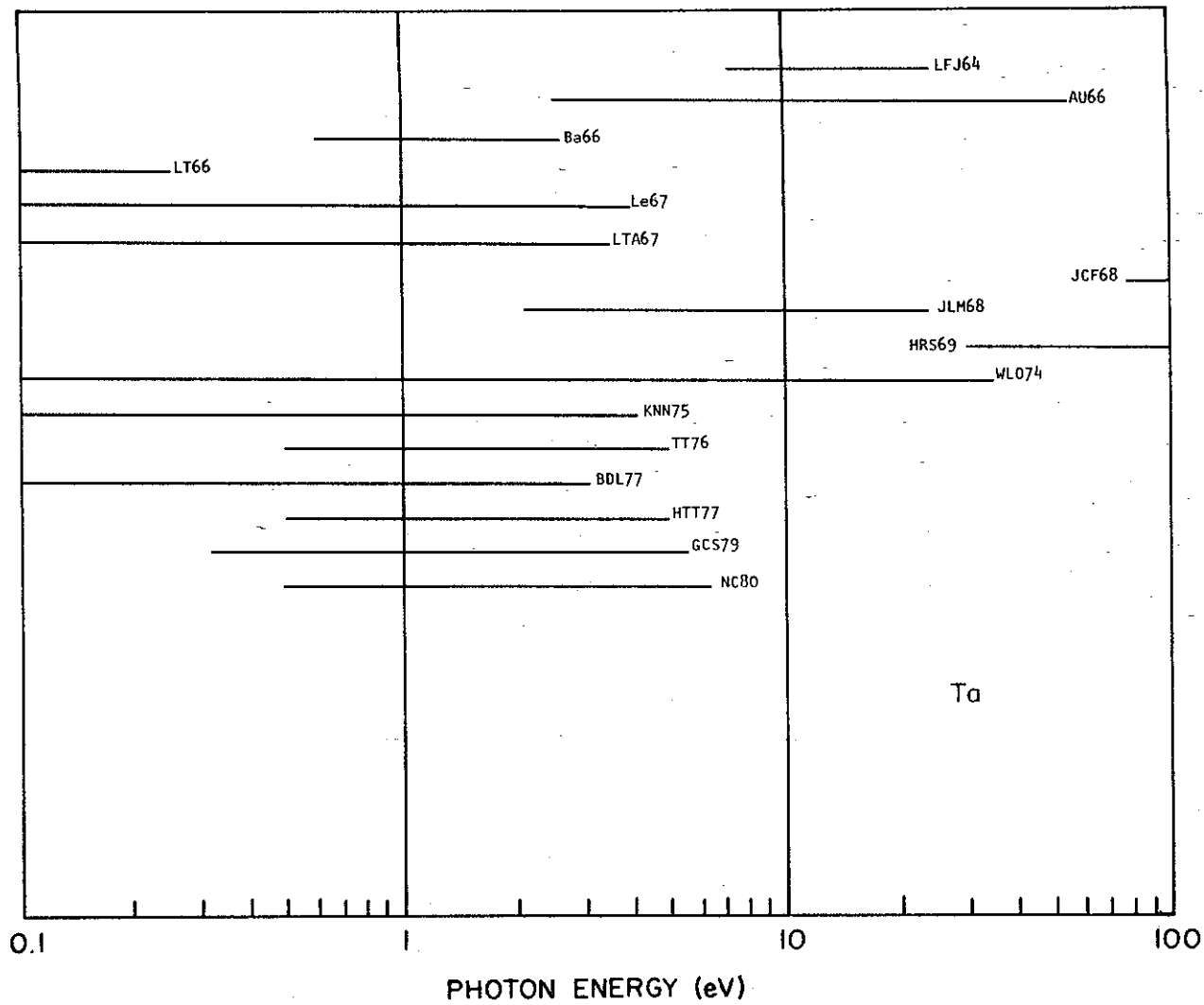


Fig. 73 Survey of available data for Ta

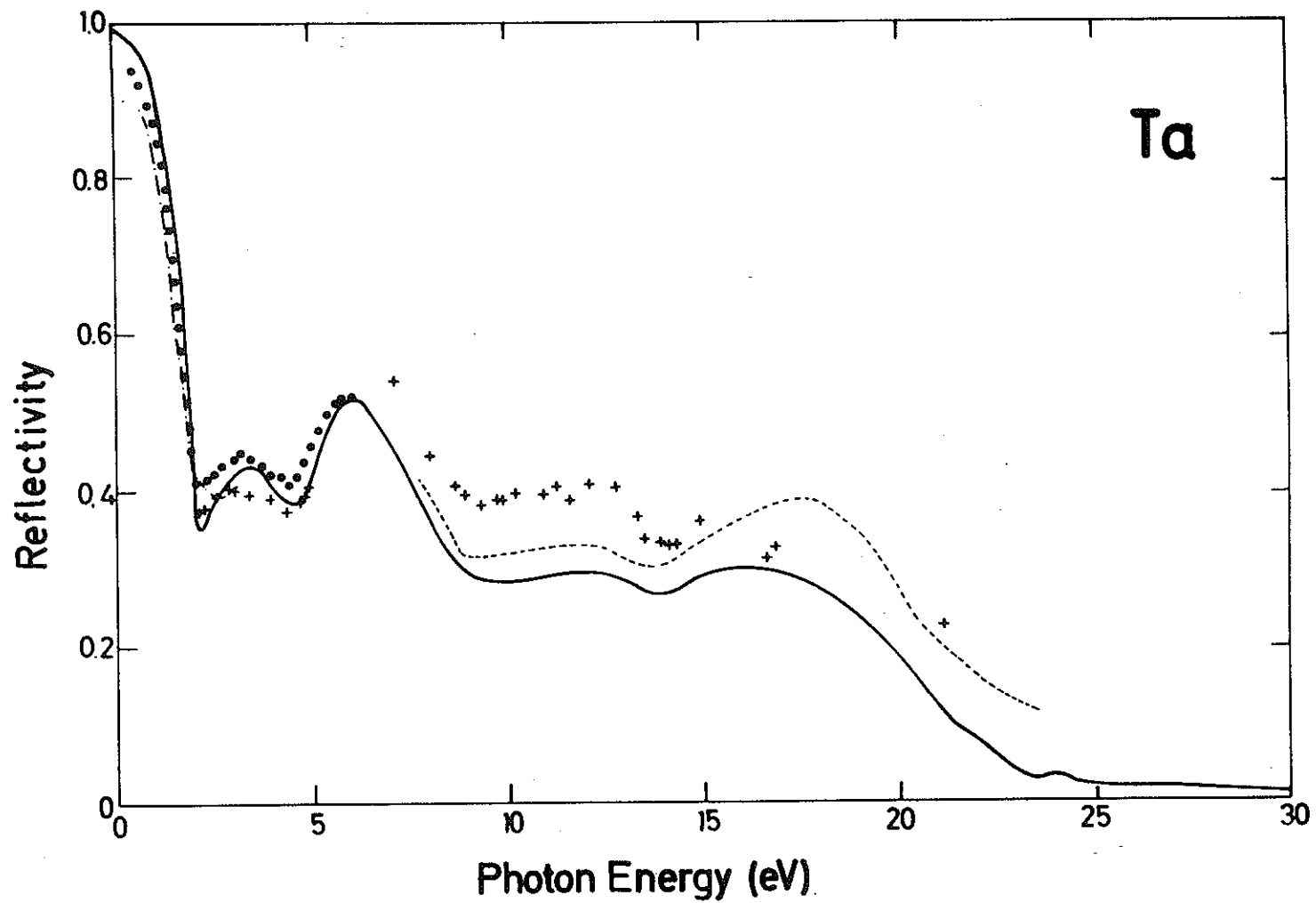


Fig. 74 Reflectivity of Ta. — WL074; ●●● NC80; +++ JLM68; --- BDL77; -.- LFJ64.

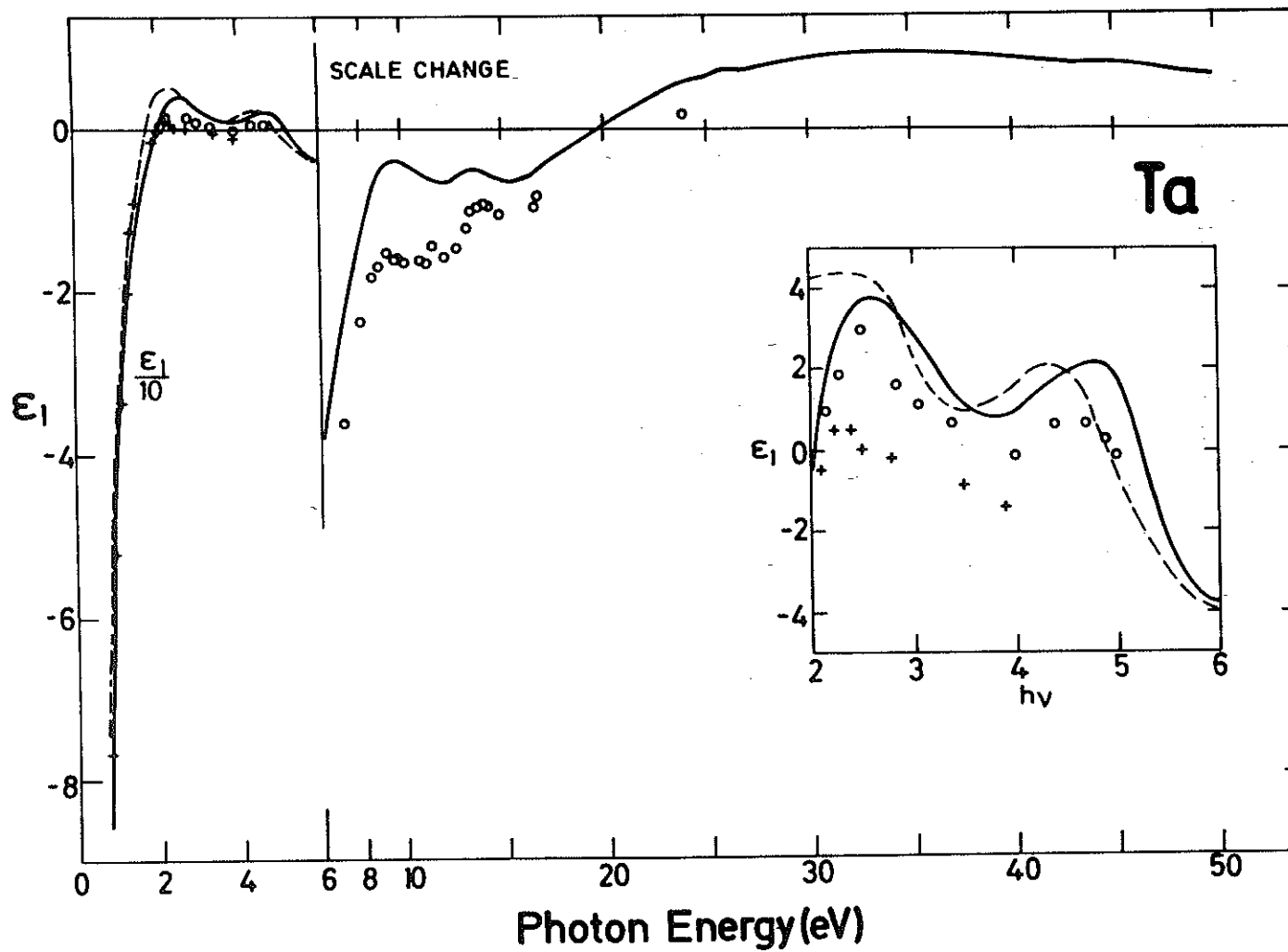


Fig. 75  $\epsilon_1$  for Ta. — WL074; +++ KNN75; --- NC80; ooo JLM68.

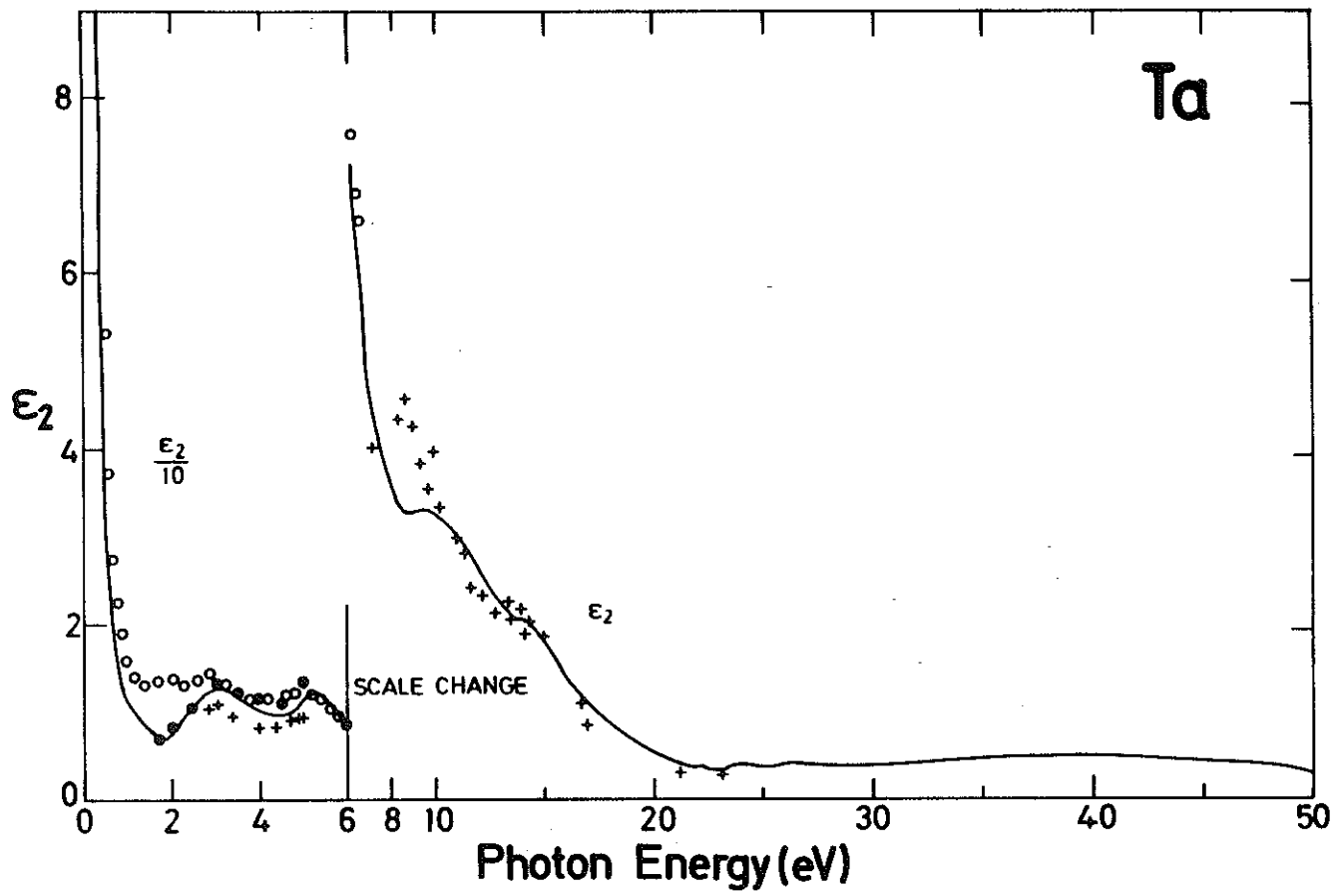


Fig. 76  $\epsilon_2$  for Ta. — WL074; +++ JLM68; ooo NC80; ●●● TT76.

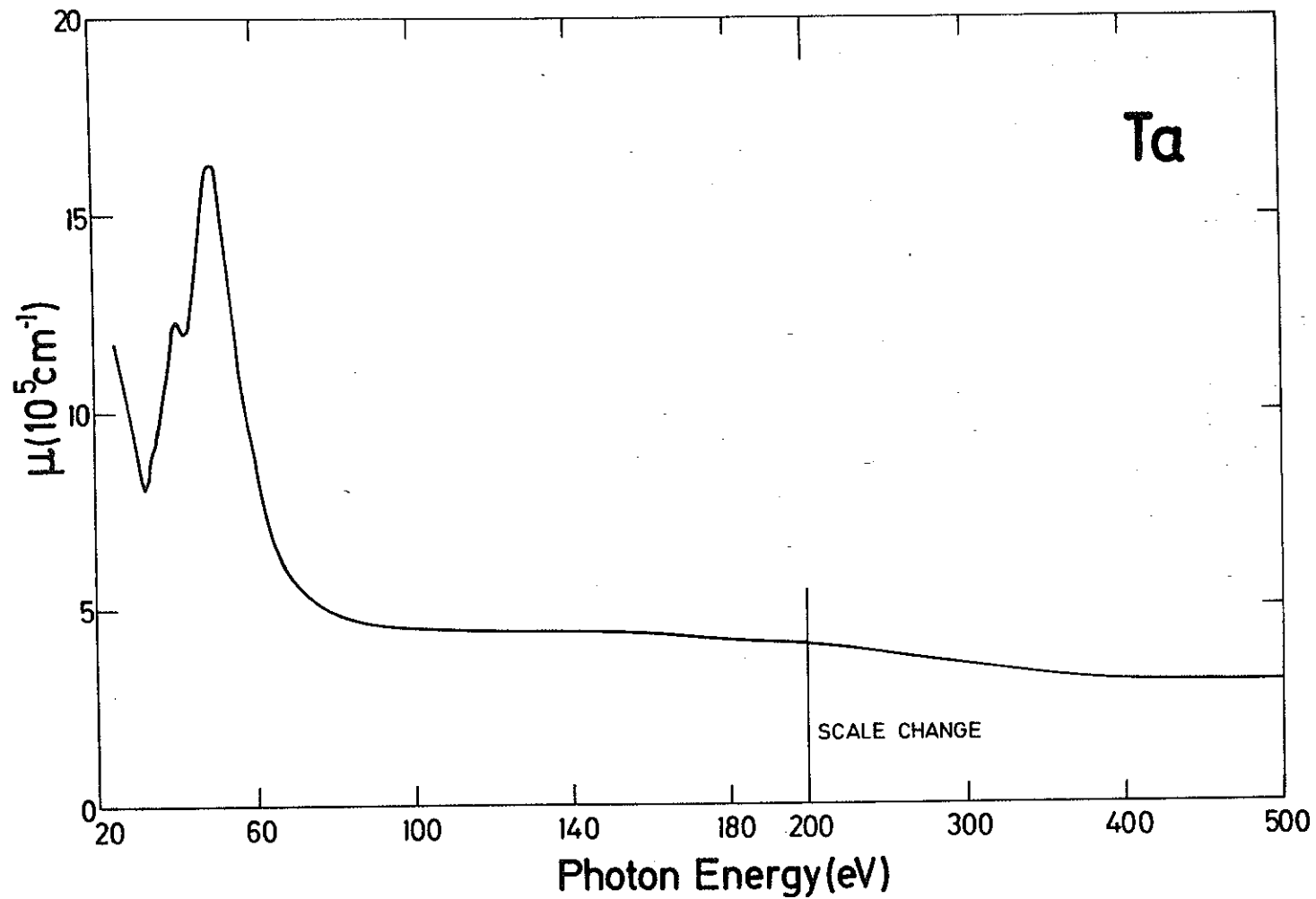


Fig. 77 Absorption coefficient for Ta reported by HRS69.

## Tantalum

publication by J.H. Weaver, D.W. Lynch, and C.G. Olson in Phys. Rev. B 10,  
501 (1973) based on the following tabulation

Energy (eV)	$\epsilon_1$	$\epsilon_2$	n	k	$\text{Im}(-1/\bar{\epsilon})$	$R(\phi=0)$
0.10	-4042.00	2541.28	19.14	66.39	0.00	.984
0.11	-3484.86	1997.03	16.30	61.24	0.00	.984
0.12	-3033.13	1589.75	13.99	56.82	0.00	.984
0.13	-2652.67	1281.37	12.11	52.91	0.00	.984
0.14	-2331.18	1052.56	10.64	49.44	0.00	.984
0.15	-2064.25	876.90	9.45	46.41	0.00	.983
0.16	-1839.62	739.07	8.45	43.72	0.00	.983
0.18	-1486.15	540.87	6.91	39.16	0.00	.983
0.19	-1345.69	468.56	6.29	37.22	0.00	.983
0.20	-1224.20	409.07	5.77	35.46	0.00	.982
0.22	-1024.82	315.70	4.88	32.38	0.00	.982
0.24	-868.36	250.07	4.20	29.77	0.00	.982
0.26	-744.69	201.89	3.67	27.53	0.00	.981
0.28	-644.99	165.52	3.23	25.60	0.00	.981
0.30	-562.87	137.29	2.87	23.90	0.00	.980
0.34	-438.95	101.03	2.40	21.09	0.00	.979
0.38	-352.12	76.56	2.03	18.87	0.00	.978
0.42	-288.01	59.89	1.75	17.06	0.00	.976
0.46	-239.37	47.86	1.54	15.55	0.00	.975
0.50	-201.46	39.20	1.37	14.26	0.00	.974
0.54	-171.42	32.78	1.25	13.15	0.00	.972
0.58	-147.30	28.03	1.15	12.19	0.00	.970
0.62	-127.59	24.14	1.06	11.35	0.00	.968
0.66	-111.17	21.23	1.00	10.59	0.00	.965
0.70	-97.52	19.03	0.96	9.92	0.00	.962
0.74	-86.05	17.10	0.92	9.32	0.00	.960
0.78	-76.20	15.55	0.89	8.77	0.00	.956
0.82	-67.71	14.29	0.86	8.27	0.00	.952
0.86	-60.32	13.22	0.85	7.81	0.00	.947
0.90	-53.76	12.38	0.84	7.38	0.00	.942
0.94	-48.06	12.05	0.86	6.99	0.00	.934
0.98	-43.29	11.69	0.88	6.64	0.01	.926
1.00	-41.11	11.48	0.89	6.47	0.01	.922
1.10	-32.19	10.68	0.93	5.75	0.01	.899
1.20	-25.51	10.04	0.98	5.14	0.01	.872
1.30	-20.36	9.27	1.00	4.62	0.02	.842
1.40	-16.15	8.67	1.04	4.15	0.03	.805
1.50	-12.71	8.09	1.09	3.73	0.04	.762
1.60	-9.75	7.64	1.15	3.33	0.05	.707
1.70	-7.20	7.30	1.24	2.95	0.07	.640
1.80	-4.92	6.99	1.35	2.60	0.10	.560
1.90	-2.56	7.01	1.57	2.24	0.13	.460
2.00	-0.61	7.26	1.83	1.99	0.14	.388
2.10	1.03	7.74	2.10	1.84	0.13	.354
2.20	2.30	8.53	2.36	1.81	0.11	.351
2.30	3.10	9.51	2.56	1.86	0.10	.365
2.40	3.46	10.31	2.68	1.92	0.09	.378
2.50	3.63	10.87	2.75	1.98	0.08	.388
2.60	3.78	11.30	2.80	2.02	0.08	.395



Ta

-219-

Energy (eV)	$\epsilon_1$	$\epsilon_2$	n	k	$\text{Im}(-1/\epsilon)$	$R(\phi=0)$
2.70	3.73	11.84	2.84	2.08	0.08	.405
2.80	3.54	12.20	2.85	2.14	0.08	.412
2.90	3.22	12.49	2.84	2.20	0.08	.420
3.00	2.86	12.60	2.81	2.24	0.08	.425
3.20	2.12	12.56	2.73	2.31	0.08	.432
3.40	1.37	12.18	2.61	2.33	0.08	.435
3.60	0.89	11.44	2.49	2.30	0.09	.430
3.80	0.84	10.67	2.40	2.22	0.09	.418
4.00	0.95	10.11	2.36	2.14	0.10	.406
4.20	1.27	9.69	2.35	2.06	0.10	.392
4.40	1.67	9.58	2.39	2.01	0.10	.384
4.60	2.00	9.81	2.45	2.00	0.10	.384
4.80	2.13	10.40	2.53	2.06	0.09	.394
5.00	1.77	11.35	2.58	2.20	0.09	.416
5.20	0.39	12.25	2.52	2.44	0.08	.450
5.40	-1.46	12.08	2.31	2.61	0.08	.480
5.60	-2.91	10.99	2.06	2.67	0.09	.501
5.80	-3.58	9.62	1.83	2.63	0.09	.510
6.00	-3.87	8.36	1.63	2.56	0.10	.515
6.20	-3.80	7.26	1.48	2.45	0.11	.512
6.40	-3.55	6.39	1.37	2.33	0.12	.504
6.60	-3.25	5.71	1.29	2.22	0.13	.492
6.80	-2.94	5.18	1.23	2.11	0.15	.478
7.00	-2.63	4.76	1.18	2.01	0.16	.462
7.20	-2.34	4.40	1.15	1.91	0.18	.445
7.40	-2.05	4.13	1.13	1.82	0.19	.425
7.60	-1.79	3.92	1.12	1.75	0.21	.406
7.80	-1.59	3.73	1.11	1.68	0.23	.390
8.00	-1.36	3.57	1.11	1.61	0.24	.370
8.20	-1.14	3.45	1.12	1.55	0.26	.350
8.40	-0.96	3.38	1.13	1.50	0.27	.332
8.60	-0.79	3.32	1.14	1.45	0.29	.317
8.80	-0.62	3.30	1.17	1.41	0.29	.301
9.00	-0.53	3.33	1.19	1.40	0.29	.294
9.20	-0.46	3.34	1.21	1.38	0.29	.289
9.40	-0.44	3.35	1.21	1.38	0.29	.287
9.60	-0.42	3.34	1.21	1.38	0.29	.285
9.80	-0.42	3.32	1.21	1.37	0.30	.285
10.00	-0.44	3.30	1.20	1.37	0.30	.286
10.20	-0.45	3.27	1.19	1.37	0.30	.286
10.40	-0.47	3.22	1.18	1.37	0.30	.287
10.60	-0.50	3.18	1.16	1.36	0.31	.288
10.80	-0.52	3.12	1.15	1.36	0.31	.289
11.00	-0.55	3.06	1.13	1.35	0.32	.290
11.20	-0.58	3.00	1.11	1.35	0.32	.292
11.40	-0.61	2.93	1.09	1.34	0.33	.293
11.60	-0.64	2.85	1.07	1.33	0.33	.294
11.80	-0.66	2.77	1.05	1.32	0.34	.295
12.00	-0.68	2.68	1.02	1.31	0.35	.296
12.20	-0.68	2.59	1.00	1.29	0.36	.295
12.40	-0.68	2.50	0.98	1.28	0.37	.294
12.60	-0.66	2.41	0.96	1.26	0.39	.292
12.80	-0.64	2.34	0.94	1.24	0.40	.289
13.00	-0.62	2.27	0.93	1.22	0.41	.286
13.20	-0.59	2.20	0.92	1.20	0.42	.282
13.40	-0.55	2.15	0.91	1.18	0.44	.276
13.60	-0.52	2.12	0.91	1.16	0.44	.272

Energy (eV)	$\epsilon_1$	$\epsilon_2$	n	k	$\text{Im}(-1/\bar{\epsilon})$	$R(\phi=0)$
13.80	-0.51	2.10	0.91	1.16	0.45	.270
14.00	-0.52	2.08	0.90	1.15	0.45	.272
14.20	-0.55	2.05	0.89	1.15	0.46	.275
14.40	-0.58	2.00	0.87	1.15	0.46	.280
14.60	-0.61	1.95	0.85	1.15	0.47	.285
14.80	-0.63	1.88	0.82	1.14	0.48	.289
15.00	-0.65	1.80	0.80	1.13	0.49	.293
15.20	-0.66	1.73	0.77	1.12	0.51	.297
15.40	-0.66	1.64	0.75	1.10	0.52	.300
15.60	-0.65	1.57	0.72	1.08	0.54	.301
15.80	-0.64	1.49	0.70	1.06	0.57	.303
16.00	-0.62	1.42	0.68	1.04	0.59	.304
16.20	-0.60	1.35	0.66	1.02	0.62	.304
16.40	-0.57	1.28	0.64	0.99	0.65	.302
16.60	-0.55	1.22	0.63	0.97	0.68	.301
16.80	-0.52	1.16	0.61	0.94	0.72	.299
17.00	-0.49	1.10	0.60	0.92	0.76	.296
17.20	-0.46	1.05	0.58	0.89	0.80	.293
17.40	-0.42	1.00	0.57	0.87	0.85	.289
17.60	-0.39	0.95	0.56	0.84	0.90	.285
17.80	-0.36	0.90	0.56	0.81	0.96	.280
18.00	-0.32	0.86	0.55	0.79	1.02	.274
18.20	-0.29	0.82	0.54	0.76	1.08	.268
18.40	-0.25	0.79	0.54	0.73	1.15	.261
18.60	-0.22	0.75	0.53	0.71	1.23	.254
18.80	-0.18	0.72	0.53	0.68	1.31	.245
19.00	-0.15	0.69	0.53	0.65	1.39	.236
19.20	-0.12	0.66	0.52	0.63	1.48	.227
19.40	-0.08	0.63	0.53	0.60	1.56	.217
19.60	-0.05	0.60	0.53	0.57	1.64	.207
19.80	-0.02	0.58	0.53	0.55	1.72	.196
20.00	0.02	0.56	0.54	0.52	1.79	.185
20.20	0.05	0.54	0.54	0.50	1.85	.175
20.40	0.07	0.51	0.55	0.47	1.91	.165
20.60	0.11	0.49	0.55	0.44	1.95	.153
20.80	0.14	0.47	0.56	0.42	1.95	.140
21.00	0.17	0.45	0.57	0.39	1.92	.127
21.20	0.22	0.44	0.59	0.37	1.84	.113
21.40	0.25	0.43	0.61	0.35	1.72	.100
21.60	0.29	0.44	0.64	0.34	1.59	.089
21.80	0.29	0.43	0.64	0.34	1.59	.088
22.00	0.31	0.41	0.64	0.32	1.54	.081
22.20	0.34	0.40	0.66	0.30	1.44	.072
22.40	0.37	0.39	0.68	0.29	1.34	.065
22.60	0.40	0.37	0.69	0.27	1.24	.058
22.80	0.44	0.36	0.71	0.26	1.13	.051
23.00	0.48	0.36	0.73	0.24	1.01	.043
23.20	0.52	0.37	0.76	0.24	0.90	.036
23.40	0.56	0.39	0.79	0.25	0.85	.033
23.50	0.56	0.40	0.79	0.25	0.84	.033
23.60	0.57	0.42	0.80	0.26	0.84	.033
23.70	0.56	0.43	0.80	0.27	0.85	.034
23.80	0.56	0.43	0.80	0.27	0.86	.035
23.90	0.56	0.42	0.79	0.27	0.86	.034
24.00	0.56	0.42	0.80	0.26	0.85	.034
24.20	0.58	0.41	0.80	0.26	0.82	.032
24.40	0.59	0.41	0.81	0.25	0.79	.030

Ta

-221-

Energy (eV)	$\epsilon_1$	$\epsilon_2$	n	k	$\text{Im}(-1/\epsilon)$	$R(\phi=0)$
24.60	0.61	0.41	0.82	0.25	0.76	.029
24.80	0.62	0.41	0.83	0.25	0.74	.027
25.00	0.63	0.41	0.83	0.25	0.72	.026
25.20	0.65	0.41	0.84	0.25	0.70	.025
25.40	0.66	0.41	0.85	0.24	0.68	.023
25.60	0.68	0.42	0.86	0.24	0.65	.022
25.80	0.70	0.43	0.87	0.25	0.64	.022
26.00	0.70	0.44	0.88	0.25	0.64	.022
26.20	0.70	0.45	0.88	0.26	0.65	.023
26.40	0.69	0.45	0.87	0.26	0.66	.023
26.60	0.69	0.45	0.87	0.26	0.66	.023
26.80	0.69	0.44	0.87	0.25	0.65	.023
27.00	0.70	0.43	0.87	0.25	0.64	.022
27.20	0.71	0.42	0.88	0.24	0.62	.021
27.40	0.72	0.41	0.88	0.24	0.60	.020
27.60	0.73	0.41	0.89	0.23	0.58	.019
27.80	0.74	0.41	0.89	0.23	0.57	.018
28.00	0.75	0.41	0.90	0.23	0.56	.017
28.20	0.76	0.41	0.90	0.22	0.54	.016
28.40	0.78	0.41	0.91	0.22	0.53	.016
28.60	0.79	0.41	0.91	0.22	0.52	.015
28.80	0.80	0.41	0.92	0.22	0.51	.015
29.00	0.81	0.41	0.92	0.22	0.50	.014
29.20	0.82	0.41	0.93	0.22	0.49	.014
29.40	0.83	0.41	0.94	0.22	0.48	.014
29.60	0.84	0.41	0.94	0.22	0.48	.014
29.80	0.85	0.42	0.95	0.22	0.47	.014
30.00	0.85	0.42	0.95	0.22	0.47	.014
30.50	0.87	0.44	0.96	0.23	0.46	.014
31.00	0.88	0.45	0.97	0.23	0.46	.014
31.50	0.89	0.46	0.97	0.24	0.46	.014
32.00	0.89	0.47	0.98	0.24	0.46	.015
32.50	0.90	0.48	0.98	0.24	0.46	.015
33.00	0.90	0.48	0.98	0.25	0.46	.015
33.50	0.91	0.49	0.98	0.25	0.46	.015
34.00	0.91	0.50	0.99	0.25	0.46	.016
34.50	0.91	0.51	0.99	0.26	0.47	.016
35.00	0.91	0.52	0.99	0.26	0.47	.017
35.50	0.91	0.53	0.99	0.27	0.48	.018
36.00	0.90	0.53	0.99	0.27	0.49	.018
36.50	0.90	0.54	0.99	0.27	0.49	.019
37.00	0.89	0.55	0.99	0.28	0.50	.019
37.50	0.88	0.55	0.98	0.28	0.51	.020
38.00	0.87	0.56	0.98	0.28	0.52	.021
38.50	0.86	0.56	0.97	0.29	0.53	.021
39.00	0.85	0.56	0.97	0.29	0.54	.022
39.50	0.84	0.56	0.96	0.29	0.55	.022
40.00	0.82	0.56	0.95	0.29	0.56	.023