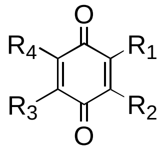
A. Izuoka



R_1	R_2	R_3	R_4	m.p.	UV-VIS	E_1	E_2	ref.
tBu	H	H	H			-0.6	-1.36	1,27
$SiMe_3$	H	H	H			-0.54	-1.25	27
H	H	H	H			-0.5	-1.22	3,27
$GeMe_3$	H	H	H			-0.55	-1.29	27
Ph	H	H	H			-0.49	-1.16	13,27
SeMe	H	H	H			-0.49	-1.22	27
C_6H_4-4F	H	H	H			-0.48	-1.18	27
C_6H_4-4I	H	H	H			-0.45	-1.13	27
C_6H_4-4Br	H	H	H			-0.45	-1.13	27
F	H	H	H			-0.37	-1.16	14,27
I	H	H	H			-0.33	-1.02	15,27
Cl	H	H	H			-0.34	-1.11	4,27
Br	H	H	H			-0.33	-1.11	2,27
CF_3	H	H	H			-0.23	-1.01	16,27
C_6H_4-4SMe	H	H	H			-0.48	-1.13	27
$C_6H_4CO_2Me$	H	H	H			-0.44	-1.13	27
C_6H_4-4CF_3	H	H	H			-0.42	-1.08	27
SePh	H	H	H			-0.43	-1.08	27
TeMe	H	H	H			-0.45	-1.15	27
Me	Me	H	H			-0.66	-1.35	9,27
OMe	OMe	H	H			-0.56	-1.22	27
tBu	H	tBu	H			-0.71	-1.46	6,27
Me	H	Me	H			-0.67	-1.37	10,27
Me	H	SMe	H			-0.48	-1.2	27
Ph	H	Ph	H			-0.47	-1.17	17,27
SeMe	H	SeMe	H			-0.47	-1.17	27
SMe	H	SMe	H			-0.54	-1.24	27
Me	H	Cl	H			-0.42	-1.2	18,27
Me	H	Br	H			-0.4	-1.13	19,27
SMe	H	Br	H			-0.36	-1.08	27
Cl	H	Cl	H			-0.18	-0.98	7,27
Br	H	Br	H			-0.16	-0.95	5,27
Me	H	H	Me			-0.66	-1.35	11,27
Cl	H	H	Cl			-0.18	-0.97	8,27
Me	Me	Me	H			-0.75	-1.44	20,27
Me	Me	Me	Me			-0.84	-1.47	21,27
F	F	F	F			+0.01	-0.87	24,27
I	I	I	I			-0.04	-0.78	25,27
Cl	Cl	Cl	Cl			+0.02	-0.78	22,27
Br	Br	Br	Br			+0.01	-0.76	23,27
Cl	Cl	CN	CN			+0.52	-0.31	26,27
H	H	H	H			-0.32	-1.07	29
						-0.51	-1.14	30
						-0.43	-1.34	31
Me	H	H	H			-0.39	-1.32	29
						-0.58	-1.10	30
Me	Me	H	H			-0.50	-1.22	29
Me	H	Me	H			-0.52	-1.32	29
						-0.67	-1.27	30
Me	H	H	Me			-0.50	-1.35	29
						-0.66	-1.14	30
Me	Me	Me	H			-0.58	-1.36	29

						-0.75	-1.35	30
Me	Me	Me	Me			-0.69	-1.51	29
						-0.84	-1.45	30
Et	H	H	Et			-0.52		29
tBu	H	tBu	H			-0.67		29
						-0.73	-1.24	30
Ph	H	Ph	H			-0.37		29
						-0.49	-1.05	30
OMe	H	OMe	H			-0.55		29
OMe	OMe	OMe	OMe			-0.47	-1.24	29
F	F	F	F			+0.21	-0.67	29
						-0.04	-0.82	30
Cl	H	H	H			-0.14	-0.91	29
						-0.34	-0.92	30
Cl	H	Me	H			-0.24	-0.89	29
Cl	Cl	H	H			-0.03	-0.76	29
Cl	H	Cl	H			0.00		29
						-0.18	-0.81	30
Cl	H	H	Cl			+0.01	-0.82	29
						-0.18	-0.81	30
Cl	Me	Cl	Me			-0.23	-1.00	29
Cl	Cl	Cl	Cl			+0.24		29
						+0.01	-0.71	30
Br	H	Br	H			-0.09	-0.88	29
-SH-C(CN)$_2$-SH-						+0.18	-0.57	29
Me	Me	H	H			-0.55	-1.5	32
Pr	Pr	H	H			-0.53		32
-(CH$_2$)$_4$-		H	H			-0.52		32
-(CH$_2$)$_3$-		H	H			-0.42	-1.3	32
Cl	Cl	H	H			-0.03	-0.76	32
Br	Br	H	H			-0.14	-0.80	32
OMe	OMe	H	H			-0.36	-1.23	32
-O(CH$_2$)$_2$O-		H	H			-0.37	-1.0	32
SMe	SMe	H	H			-0.29	-1.3	32
Cl	H	I	H	154	243,287,370	+0.01	-0.74	33
Br	H	I	H	177	240,295,370	+0.03	-0.77	33
I	H	I	H		238,308,353	+0.02	-0.77	33
Cl	H	MeO	H	173		-0.25	-1.01	33
Br	H	MeO	H			-0.22	-1.06	33
I	H	MeO	H	191	237,294,322	-0.25	-1.01	33
CH_3	H	CF_3	H	37	241,314	-0.13	-0.97	33
OMe	H	CF_3	H	101	250,363	-0.13	-1.00	33
CF_3	H	CF_3	H	103	238,305	+0.23	-0.68	33
CH_2Cl	H	CH_2Cl	H	186		-0.36	irr	34
CH_2F	H	CH_2F	H	154		-0.31	irr	34

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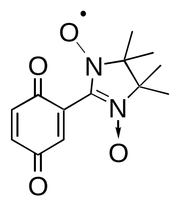

	E_1	E_2	Ref.
	-0.23		1

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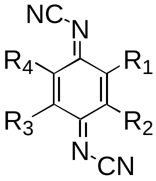

R_1	R_2	R_3	R_4	mp	UV-VIS	E_2	E_1	ref
H	H	H	H			-0.25	+0.39	1
						-0.44	+0.08	2
						-0.43	+0.08	3a
						-0.43	+0.23	3b
						-0.43	+0.08	4a
						-0.43	+0.23	4b
Me	H	H	H			-0.31	+0.31	1
Me	Me	H	H			+0.23		1
						-0.38	+0.23	6
Me	H	Me	H			-0.38	+0.21	1
						+0.22		5
Me	H	H	Me			-0.37	+0.21	1
Me	Me	Me	H			-0.38	+0.25	1
Me	Me	Me	Me			-0.39	+0.05	1
Et	H	H	Et			-0.42	+0.16	1
tBu	H	tBu	H			-0.47	+0.16	1
Ph	H	Ph	H			-0.27	+0.34	1
OMe	H	OMe	H			-0.42	+0.15	1
						+0.16		5
OMe	OMe	OMe	OMe			-0.33	+0.22	1
F	F	F	F			+0.11	+0.79	1
Cl	H	H	H			-0.05	+0.49	1
Cl	H	Me	H			-0.20	+0.43	1
Cl	Cl	H	H			-0.05	+0.62	1
Cl	H	Cl	H			0.00	+0.65	1
						+0.61		5
Cl	H	H	Cl			-0.12	+0.55	1
Cl	Me	Cl	Me			-0.14	+0.43	1
Cl	Cl	Cl	Cl			+0.13	+0.76	1
Br	H	Br	H			-0.02	+0.63	1
-SH-C(CN)$_2$-SH-						+0.11	+0.78	1
Me	H	I	H			+0.42		5
Me	H	MeO	H			+0.19		5
Br	H	MeO	H			+0.35		5
Br	H	I	H			+0.62		5
I	H	I	H			+0.63		5
Me	H	Br	H			+0.42		5
Cl	H	MeO	H			+0.35		5
Br	H	Br	H			+0.61		5
Cl	H	Br	H			+0.61		5
Pr	Pr	H	H			-0.38	+0.23	6
-(CH$_2$)$_4$-		H	H			-0.39	+0.22	6
-(CH$_2$)$_3$-		H	H			-0.33	+0.31	6
Br	Br	H	H			-0.03	+0.62	6
OMe	OMe	H	H			-0.28	+0.33	6
Cl	H	I	H	114	210,340,350	0.64	0.01	7
Br	H	I	H	226	355,370	0.65	0.02	7
I	H	I	H	233	335	0.63	0.00	7
Cl	H	MeO	H	185	260,350,370,430	0.43	-0.19	7
Br	H	MeO	H	180	293,340,355,365,440	0.44	-0.20	7

I	H	MeO	H	209	304,364,379	0.40	-0.20	7
CH_3	H	CF_3	H	154	327,340	0.55	-0.14	7
OMe	H	CF_3	H	136	330,344,425	0.53	-0.15	7
CF_3	H	CF_3	H	180	316,330,346	0.83	0.06	7
CH_2Cl	H	CH_2Cl	H	137-139		0.35*	irr	7
CH_2F	H	CH_2F	H	176-178		0.33*	0.35	7

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(${CH_2Cl_2}/{Bu_4NBF_4}$/Pt vs. Ag/AgCl/CH_3CN)
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(Scan rate 20 mV/s, E vs. SCE, 0.1 M Bu_4NClO_4 in acetonitrile)
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(in MeCN, Pt vs. Ag/AgCl)
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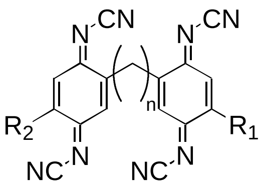
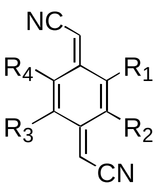
(Ag/AgCl; in CH_2Cl_2 (*: in MeCN); Bu_4NBF_4)



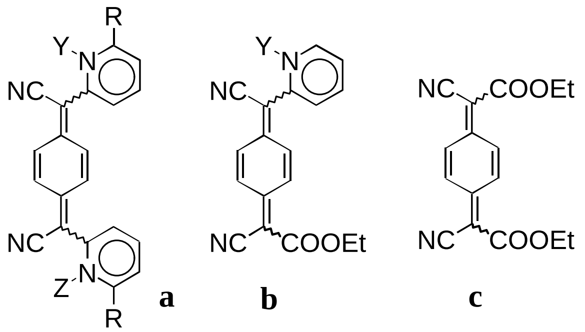
R_1	R_2	n	E_1	E_2	Ref.
H	H	3	+0.36, +0.30	-0.30, -0.36	1
H	CH_3	3	+0.33, +0.24	-0.32,-0.43	1
CH_3	CH_3	3	+0.28, +0.22	-0.36, -0.43	1
Br	CH_3	3	+0.47, +0.23	-0.19, -0.42	1
Br	Br	3	+0.50, +0.44	-0.17, -0.22	1
H	H	4-6	+0.32 to +0.31	-0.31 to -0.33	1
CH_3	CH_3	4-6	+0.23 to +0.22	-0.39 to -0.41	1
Br	Br	4-6	+0.45 to +0.43	-0.18 to -0.19	1

1. S.Hünig, K.Sinzger, *Synth. Met.*, **1991**, *41-43*, 1823. (Pt/Ag/AgCl; $TBABF_4$; CH_2Cl_2)



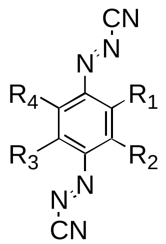
R	mp	E_1	E_2	Ref.
R_1=R_3=$(CH_2)_3C_6H_5$	139-140	+0.06	-0.55	1

1. H.E.Katz, M.L.Schilling, *J.Chem.Soc.Perkin.1* **1993**, 2363.
(in CH_2Cl_2, working electrode: glassy carbon, sweep rate 20 mV/s)



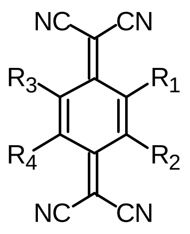
	R,Y,Z	E_1	E_2	Ref.
a	Y=Z=lone pair (lp)	-0.42*	-0.82	1
a	Y=Z=Me(+)	-0.16*		1
a	Y=Me(+), Z=lp	-0.06*	-0.42	1
a	R=PO(OEt)$_2$, Y=Z=lp	-0.32*	-0.71	1
b	Y=lone pair(lp)	-0.17*	+0.16	1
b	Y=Me(+)	+0.67*		1
c		-0.1*		1

1. H.E.Katz, M.L.Schilling, *J.Org.Chem.* **1991**, *53*, 5318.
(* in 0.05M Bu_4NPF_6 unless otherwise noted, vs SCE)



R_1	R_2	R_3	R_4	E_1	E_2	Ref.
Me	H	Me	H	-0.15	+0.20	1
H	H	H	H	-0.15	+0.22	1
Cl	H	Cl	H	+0.07	+0.47	1

1. H.Almen, et al., *Angew. Chem. Int. Ed. Engl.* **1991**, *30*, 561.
(Pt vs Ag/AgCl/CH_3CN, electrolyte n-Bu_4NBF_4)

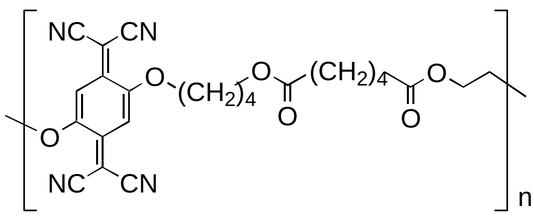


R_1	R_2	R_3	R_4	mp	E_1	E_2	Ref.
H	H	H	H		-0.083	-0.725	1
					+0.18	-0.42	2
					-0.09	-0.75	3
					+0.22	-0.35	4
					+0.08	-0.48	5
					+0.18	-0.36	6
					+0.39	-0.28	7

					+0.13	-0.29	8
					+0.17	-0.37	9
					+0.21	-0.17	10
F	H	H	H		+0.017	-0.626	1
					+0.260	-0.216	11
F	F	F	F		+0.270	-0.332	1
					+0.79	+0.11	9
Me	H	H	H		+0.12	-0.26	10
					+0.17	-0.34	12
				201-202	+0.170	-0.340	13
Me	H	Me	H		+0.10	-0.38	9
					+0.02	-0.28	10
				283-284	+0.110	-0.350	13
Me	Me	Me	Me		Em = -0.40		7
OMe	H	OMe	H		-0.01	-0.47	9
Cl	H	H	H		+0.29	-0.22	9
Cl	H	Me	H		+0.26	-0.23	9
Cl	H	Cl	H		+0.41	-0.10	9
Br	H	Br	H		+0.41	-0.08	9
n-Pro	H	H	H	125-127	+0.10	-0.31	10
Et	H	Et	H	176-177	+0.120	-0.365	13
Et	H	H	H	137-138	+0.140	-0.376	14
R_1=*n*-$C_{12}H_{25}$				119-120	+0.138	-0.366	14
$R_1=CH_2C_6H_5$				165.5-167	+0.166	-0.338	14
$R_1=OCH_2CH_2OH$, R_3=Br				156-158	+0.305	-0.170	15
$R_1=OCH_2CH_2OH$				173.0-174.5	+0.107	-0.398	15
$R_1=OCH_2CH_2OH$					-0.189	-0.690	16
$R_1=OCH_2CH_2OH$, R_3=Cl					-0.086	-0.580	17
$R_1=OCH_2CH_2OH$, R_3=Et					-0.244	-0.717	17
$R_1=OCH_2CH_2OH$, R_3=OMe					-0.312	-0.779	17
R_1-R_2=-$(CH_2)_3$-				194-195	-0.218	-0.742	18
R_1-R_2=-$(CH_2)_3$-, R_3=Cl				135-136	-0.074	-0.501	18
$R_1=R_3$= $CH_2C_6H_5$				226-227	+0.28	-0.24	19
$R_1=R_3=CH_2C_6H_5$				226-227	-0.01	-0.32	20
$R_1=R_3$= $CH_2C_6H_4$-4OMe				227-228	+0.26	-0.22	19
$R_1=R_3=CH_2C_6H_4$-4NO_2				276	+0.33	-0.15	19
$R_1=R_3=CH_2$(B-Naphtyl)				285-286	+0.29	-0.25	19
$R_1=R_3=(CH_2)_3C_6H_5$				174-175	+0.14	-0.39	21

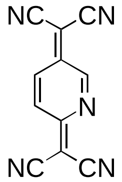
1. A.N.Bloch, et al., *J. Org. Chem.* **1985**, *50*, 1789.
   (vs. Ag/$AgNO_3$, 0.1 M Bu_4NBF_4 in buthylonitrile)
2. T.H.Jozefiak, et al., *J. Org. Chem.* **1988**, *53*, 5007.
   (vs. SCE, 0.1 M Bu_4NBF_4 in dimethylformamide)
3. D.O.Cowan, et al., *J. Am. Chem. Soc.* **1985**, *107*, 556.
   (vs. Ag/$AgNO_3$, 0.1 M Bu_4NBF_4 in buthylonitrile)
4. P.Bando, et al., *Synth. Met.* **1993**, *55-57*, 1721.
   (vs. SCE, 0.1 M Bu_4NPF_6 in dichloromethane, Scan rate 20 mV/s)
5. C.Seoane, et al., *J. Org. Chem.* **1992**, *57*, 6192.
   (vs. SCE, 0.1 M Bu_4NClO_4 in acetonitrile, Scan rate 20 mV/s)
6. T.Suzuki, et al., *Chem. Lett.* **1986**, 715.
   (vs. SCE, 0.1 M Et_4NClO_4 in acetonitrile, Scan rate 100 mV/s)
7. A.Anmüller S.Hünig, *Liebig Ann.* **1986**, 142.
   (CH_2Cl_2/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)
8. D.S.Acker, W.R.Hertler, *J. Am. Chem. Soc.* **1962**, *84*, 3370.
   (CH_3CN/dropping mercury electrode/$LiClO_4$ vs SCE.)
9. R.C.Wheland, J.L.Gillson, *J. Am. Chem. Soc.* **1976**, *98*, 3916.
   (CH_3CN/Et_4NClO_4 vs. SCE.)
10. J.Diekmann, et al., *J. Am. Chem. Soc.* **1963**, 2719. (in MeCN)
11. J.P.Ferraris, G.Saito, *J.C.S.Chem.Comm.* **1978**, 992.
    (vs. SCE; 0.1M $LiClO_4$;MeCN; Pt electronode; 25°C)

12. J.R.Anderson, O.Jørgensen, *J. Chem. Soc. Perkin.1* **1979**, 3095.
(CH_3CN/Bu_4NBF_4/Pt vs. SCE.)
13. J.R.Andersen, O.Jorgensen, *J. Chem. Soc. Perkin.1* **1979**, 3095.
(vs. SCE at a Pt-button elecrode in CH_3CN-$[Bu_4N][BF_4]$(0.1M))
14. W.P.Roberts, C.L.Ebner, *J.Org.Chem.* **1987**, *52*, 2297.
(0.1M Et_4NClO_4 in CH_3CN Pt working and auxiliary electrodes, scan rate 50mV/s)
15. Y.Miura, et al., *J.Org.Chem.* **1988**, *53*, 439.
(n volts vs SCE at a Pt-button electrode in acetonitrile with Bu_4NClO_4, Bu_4NBF_4 (0.1M))
16. C.A.Pentta, et al.,*Synlett.* **1991**, 301.
(Ag/$AgNO_3$; in MeCN; Bu_4NPF_6)
17. Z.Fang, Ph.D.Dissertation, Univ. of Mississippi, 1995.
(Ag/$AgNO_3$; in MeCN; Bu_4NPF_6)
18. C.A.Panetta, et al., *Synthesis* **1997**, 1085.
(Ag/$AgNO_3$; in MeCN; Bu_4NPF_6)
19. J.Y.Becker, et al., *J.Org.Chem.* **1988**, *53*, 1689.
(in DMF/0.1M Bu_4NBF_4, on glassy carbon vs Ag wire 1mV/s)
20. J.Y.Becker, et al., *J. Am. Chem. Soc.* **1983**, *105*, 4468.
(vs. Ag wire at 100mV/s in CH_3CN - 0.1M $LiClO_4$)
21. H.E.Katz, M.L.Schilling, *J. Chem. Soc. Perkin.1* **1993**, 2363.
(in CH_2Cl_2, working electrode;glassy carbon ,sweep rate 20mV/s)

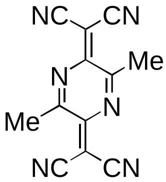


	E_1	E_2	Ref.
	+0.06	-0.39	1

1. R.W.Day, et al., *J. Am. Chem. Soc.* **1982**, *104*, 6804.
(vs. SCE 20mV/s in aqueos 0.5M $NaClO_4$, 0.01M NaCl)



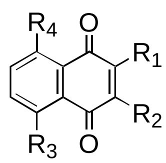
a



b

	mp	UV-VIS	E_1	E_2	Ref.
a			+0.48	-0.18	1
b			+0.48	-0.18	2

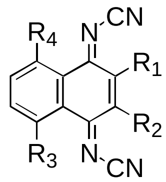
1. Y.Hama, et al., *Bull.Chem.Soc.Jpn.* **1988**, *61*, 1683.
(Ag/AgCl, Pt electrode in CH_2Cl_2 containing tetrabutlammonium scan rate $100mVs^{-1}$)
2. F.Ogura, et al., *Synth. Met.* **1988**, *27*, B295.
(Ag/AgCl, Pt electrode in CH_2Cl_2 containing tetrabutlammonium scan rate $100mVs^{-1}$)



R_1	R_2	R_3	R_4	m.p.	E_1	E_2	ref.

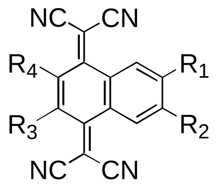
H	H	H	H		-1.21	-0.53	1
					-1.25	-0.71	2
					-0.61	-1.41	9
					-0.64	-1.40	10
Me	H	H	H		-1.33	-0.62	1
					-1.28	-0.77	2
					-1.41	-0.77	4,7
Br	H	H	H		-1.21	-0.52	3,7
Me	Me	H	H		-1.44	-0.85	5,7
Cl	Cl	H	H		-0.94	-0.26	1
					-1.11	-0.42	6,7
H	H	OMe	OMe		-1.32	-0.65	1
R_5R_6 >1,4-methylene-tetramethylene				136-138	-0.69	-1.20	8
R_5R_6 >1,4-ethylene-tetramethylene				148-150	-0.75	-1.20	8
R_5R_6 >2,5-methylene-cyclohexene				162-163	-0.62	-1.13	8
R_2R_3 >1,4-ethylene-tetramethylene, R_5R_6 >2,5-methylene-cyclohexene				224-225	-0.77	-1.195	8
R_2R_3 >1,4-ethylene-tetramethylene, R_5R_6 >1,4-methylene-tetramethylene				210-211	-0.74	-1.14	8

1. A.Anmüller, S.Hünig, *Liebig Ann.* **1986**, 142. (CH_2Cl_2/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)
2. M.E.Peover, *J. Chem. Soc.* **1962**, 4540. (CH_3CN/dropping mercury electrode/Et_4NClO_4 vs SCE)
3. T.Zincke, et al., *Ber.* **1894**, *27*, 2758; H.H.Hodgson, *J. Chem. Soc.* **1935**, 1850.
4. L.F.Fieser, *J. Biol. Chem*. **1940**, *133*, 391.
5. L.I.Smith, et al., *J. Am. Chem. Soc.* **1937**, *59*, 662.
6. L.F.Fieser, *J. Am. Chem. Soc.* **1948**, *70*, 3151; R.Gaertner, *J. Am. Chem. Soc.* **1954**, *76*, 6150.
7. **杉浦健一、博士論文 1992**. (MeCN / TBAClO4 / vs. SCE).
8. D.F.Rothenfluh, et al., *J.Chem.Soc. Perkin.2* **1996**, 639.
   (Scan rate 100mV/s, E vs. Ag/AgCl, 0.1 M TBA•BF4 in acetonitrile)
9. T.H.Jozefiak, et al., *J. Org. Chem.* **1988**, *53*, 5007.
   (E vs. Ag/AgCl, 0.1 M TBA•BF4 in dimethylformamide)
10. J.Bernstein, et al., *J. Org. Chem.* **1991**, *56*, 1569.
    (Scan rate 100mV/s, E vs. Ag/AgCl, 0.1 M TBA•ClO4 in dimethylformamide)



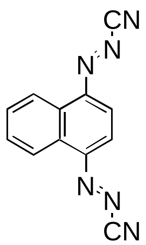
R_1	R_2	R_3	R_4	E_1	E_2	ref.
H	H	H	H	-0.35	+0.19	1
				-0.54	+0.05	2
Me	H	H	H	-0.38	+0.10	1
H	H	OMe	OMe	-0.48	+0.01	1
Cl	Cl	H	H	-0.11	+0.37	1

1. A.Anmüller, S.Hünig, *Liebig Ann.* **1986**, 142.
   (CH_2Cl_2/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)
2. J.Bernstein, et al., *J. Org. Chem.* **1991**, *56*, 1569.
   (Scan rate 100 mV/s, E vs.Ag / AgCl, 0.1 M TBA•ClO4 in dichloromethane)



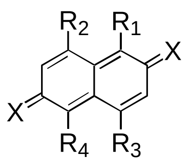
R_1	R_2	R_3	R_4	m.p.	UV-VIS	E_1	E_2	ref.
H	H	H	H			+0.08	-0.48	1
						0.00	-0.43	2
					395nm (4.8388)	-0.26	-0.745	3
CH_2OH	H	H	H			-0.315	-0.781	4
R_5R_6 >1,4-methylene-tetramethyene				249-250		-0.05	-0.15	5
R_5R_6 >1,4-ethylene-tetramethylene				300		-0.10(2e)		5
R_5R_6 >2,5-methylene-cyclohexene				216-218		+0.075	-0.32	5
R_2R_3 >1,4-ethylene-tetramethylene, R_5R_6 >1,4-methylene-tetramethylene								
				>260 (dec)			-0.10	-0.21
	5							
R_2R_3 >1,4-ethylene-tetramethylene, R_5R_6 >2,5-methylene-cyclohexene								
				>240		-0.14 (2e)		5
R_5R_6 >ethylene						-0.10	-0.47	6

1. A.Aumuller, S.Hunig, *Liebigs Ann. Chem.* **1984**, 618.
   (E vs. SCE, 0.1 M $LiClO_4$ in acetonitrile)
2. T.H.Jozefiak, et al., *J. Org. Chem.* **1988**, *53*, 5007.
   (E vs. SCE, 0.1 M Bu_4NBF_4 in dimethylformamide)
3. D.O.Cowan, et al., *J. Am. Chem. Soc.* **1985**, *107*, 556.
   (E vs. Ag/AgNO3, 0.1 M Bu_4NBF_4 in buthylonitrile)
4. C.A.Pentta, et al.,*Synlett.* **1991**, 301. (Ag/$AgNO_3$; in MeCN; Bu_4NPF_6)
5. D.F.Rothenfluh, et al., *J.Chem.Soc. Perkin.2* **1996**, 639.
   (Scan rate 100 mV/s, E vs. Ag/AgCl, 0.1 M Bu_4NBF_4 in acetonitrile)
6. H.Tatemitsu, et al., *J.C.S. Chem. Commun.* **1982**, 1065
   (E vs. SCE, 0.1 M Et_4NClO_4 in acetonitrile)



E_1	E_2	ref.
-0.01	+0.32	1

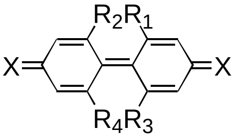
1. H.Almen, et al., *Angew. Chem. Int. Ed. Engl.* **1991**, *30*, 561.
   (Pt vs Ag/AgCl/CH_3CN, electrolyte nBu_4NBF_4)



R	m.p.	UV-VIS	E_1	E_2	ref.
X=O, R_1=R_4=Cl			-0.09		1

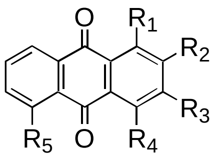
X=O, R_1=R_4=Br			-0.09		1
X=$C(CN)_2$		>420	472,258,248	+0.21	-0.17
2					
			-0.047	-0.505	3
X=$C(CN)_2$, (R_1-R_2)=(R_3-R_4)=-$(CH_2)_3$-	222	515,489,265	+0.12	-0.11	4

1. K. Nakasuji, K. Sugiura, T. Kitagawa, J. Toyoda, H. Okamoto, K. Okaniwa, T. Mitani, H. Yamamoto, I. Murata, A. Kawamoto, J. Tanaka, *J. Am. Chem. Soc*, **1991**, *113*, 1862.
(V vs. SCE in Et_4NClO_4/DMF)
2. J. Diekmann, W. R. Hertler, R. E. Benson, *J. Amer. Chem. Soc.*, 1963, 2719.
(in MeCN)
3. A. N. Bloch, M. Maxfield, D. O. Cowan, *J. Org. Chem.* **1985**, *50*, 1789.
(E vs. Ag/$AgNO_3$, 0.1 M TBA•BF_4 in buthylonitrile)
4. S. Yaguchi, K. Nagareda, T. Hnafusa,*Synthetic Metals*, **30**, 1989, 401-402.
(*vs.* SCE at grassy carbon ele.; scan rate 200mV/s; Solvent. MeCN; n-$Bu_4N^+ClO_4$)



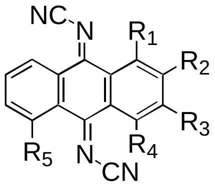
R	m.p.	UV-VIS	E_1	E_2	ref.
X=$C(CN)_2$				+0.31	
1a					
			+0.31	-0.15	1b
X=$C(CN)_2$, (R_1-R_2)=(R_3-R_4)=-$(CH_2)_2$-					
	>360	265(3.55), 349(3.50), 571(3.63)	-0.145	-0.449	2
	> 375	349(3.50) 571(3.62)	-0.012	-0.214	3
			-0.135	-0.415	4

1. A. W. Addison, Nar S. Dalal,Y. Hoyano, S. Huizinga, L. Weller,Can. J. Chem., 55, 1977, 4191-4198.
(vs. Ag/AgClO4, (a) in MeCN, (b) in DMF)
2. A. N. Bloch, M. Maxfield, D. O. Cowan, J. Org. Chem. 50 (1985) 1789
(E vs.Ag / $AgNO_3$, 0.1 M TBA•BF_4 in buthylonitrile)
3. D. O. Cowan, M. Maxfield, T. O. Poehler, A. N. Bloch, Nouveau Journal de Chimie 3 (1979) 647
(Scan rate 100mV/s, E vs. SCE, 0.1 M TBA•BF_4 in acetonitrile)
4. A. Aharon-Shalom, J. Y. Becker, I. Agrana, Nouveau Journal de Chimie 3 (1979) 643
(Scan rate 500mV/s, 2.4mM of sample, E vs. Ag/$AgNO_3$, 0.1 M TBA•ClO_4 in DMF)



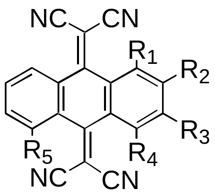
R_1	R_2	R_3	R_4	R_5	E_1	E_2	ref.
H	H	H	H	H	-1.33	-0.78	1
					-1.45	-0.94	2
					-1.58	-0.85	3
H	Me	H	H	H	-1.41	-0.75	1
H	Me	Me	H	H	-1.30	-0.85	1
OMe	H	H	OMe	H	-1.48	-0.89	1
Cl	H	H	H	Cl	-1.26	-0.69	1

1. A. Anmüller, S. Hünig, *Liebig Ann.* **1986**, 142.
   (CH_2Cl_2/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)
2. M.E.Peover, *J. Chem. Soc.*, **1962**, 4540.
   (CH_3CN/dropping mercury electrode/Et_4NClO_4 vs SCE)
3. T.H.Jozefiak, et al., *J. Org. Chem.* **1988**, *53*, 5007.
   (E vs. SCE, 0.1 M TBA•BF4 in dimethylformamide)



R_1	R_2	R_3	R_4	R_5	E_1	E_2	ref.
H	H	H	H	H	-0.46	-0.11	1
H	Me	H	H	H	-0.52	-0.18	1
H	Me	Me	H	H	-0.55	-0.20	1
OMe	H	H	OMe	H	-0.59	-0.39	1
Cl	H	H	H	Cl	-0.43	-0.20	1

1. A. Anmüller, S. Hünig, *Liebig Ann.* **1986**, 142.
   (CH_2Cl_2/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)

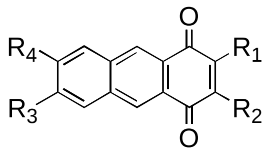


R_1	R_2	R_3	R_4	R_5	m.p.	UV-VIS	E_1	E_2	ref.
H	H	H	H	H			-0.41 (2e)		1
					367	347(4.43), 305 (4.22), 283 (4.48)	-0.71 (2e)		2a
							-0.705 (2e)		2b
							-0.285 (2e)		2c
							-0.37 (2e)		3
							-0.20		4
							-0.23		5
							-0.28		6
							-0.46		7
H	Me	H	H	H			-0.22		4
H	Me	Me	H	H			-0.23		4
							-0.25		5
OMe	H	H	OMe	H			-0.46		4
Cl	H	H	H	Cl			-0.29		4
							-0.31		5

1. T. H. Jozefiak, et al., *J. Org. Chem.* **1988**, *53*, 5007.
   (E vs. SCE, 0.1 M TEA•BF4 in dimethylformamide)
2. D. O. Cowan, et al., *J. Am. Chem. Soc.* **1985**, *107*, 556.
   ((a) E vs. Ag/AgCl, 0.1 M TEA•BF4 in dimethylformamide;
   (b) E vs. Ag/AgNO3, 0.1 M TBA•BF4 in buthylonitrile;

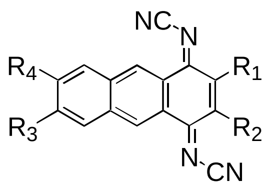
(c) E vs. Ag/AgNO3, 0.1 M TBA•BF4 in dimethylformamide)

3. T. Suzuki, et al., *Chem. Lett.* **1986**, 715.
(Scan rate 100mV/s, E vs. SCE, 0.1 M TEA•ClO4 in acetonitrile)
4. A. Anmüller, S. Hünig, *Liebig Ann.* **1986**, 142. (CH_2Cl_2/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)
5. A. Anmüller, S. Hünig, *Liebig Ann.* **1986**, 142. (CH_3CN/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)
6. A. M. Kini, et al., *J. Am. Chem. Soc.* **1985**, *107*, 556. (CH_3CN/Et_4NClO_4 vs. Ag/AgCl)
7. S. Yamaguchi, et al., *Chem. Lett.*, **1983**, 1229. (CH_3CN/glassy carbon/Et_4NClO_4 vs. SCE)



R_1	R_2	R_3	R_4	m.p.	E_1	E_2	ref.
H	H	H	H		-0.57	-1.13	1
					-0.57	-0.70	3
					-1.16	-0.58	4
					-1.25	-0.75	5
OMe	H	H	H		-0.73	-1.23	1
					-0.73	-1.23	2
				212-214	-0.73	-1.23	3
OMe	H	OMe	OMe		-0.74	-1.24	1
					-0.74	-1.24	2
				>320	-0.74	-1.24	3
Me	H	H	H		-0.70	-1.26	2
				142-144	-0.70	-1.26	3
Me	Me	H	H		-0.64	-1.16	1
					-0.64	-1.16	2
					-0.64	-1.16	3
Me	Me	OMe	OMe	307-309	-0.72	-1.20	3
Cl	H	H	H		-0.48	-1.04	3
Cl	Cl	H	H		-0.42	-0.90	1
					-0.42	-0.90	3
OMe	Br	H	H		-0.57	-1.15	2
				228-230	-0.57	-1.15	3
Br	Br	H	H		-0.31	-0.88	2
				293-294	-0.31	-0.88	3

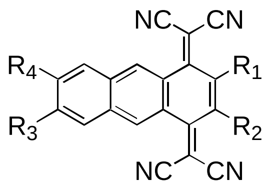
1. N.Martin, et al., *J. Org. Chem* **1995**, *40*, 4007.
(vs. Ag wire as Ag/Ag+ quasireference electrode; electrolyte Bu_4NClO_4; in MeCN; scan rate 20mV/s)
2. J.M.Pingarron, et al., *Synth. Metals* **1993**, *55-57*, 1717.
(RT, scan speed 20mV/s, E vs. SCE, Bu_4NPF_6 in acetonitrile)
3. A.Gonzalez, et al., *Tetrahedron Lett.* **1993**, *49*, 4881.
(scan speed 20 mV/s, E vs. SCE, Bu_4NClO_4 in acetonitrile)
4. A.Anmüller, S.Hünig, *Liebig Ann.* **1986**, 142.
(CH_2Cl_2/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)
5. M.E.Peover, *J. Chem. Soc.* **1962**, 4540.
(CH_3CN/dropping mercury electrode/Et_4NClO_4 vs SCE)



R_1	R_2	R_3	R_4	m.p.	E_1	E_2	ref.

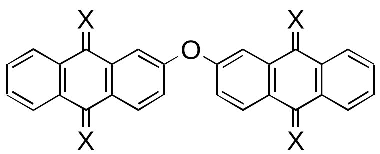
H	H	H	H			-0.38	+0.11	1
				283-284		-0.13	-0.64	3
Me	H	H	H			-0.17	-0.62	2
				>350		-0.17	-0.62	3
OMe	H	H	H			-0.11	-0.53	2
				>350		-0.12	-0.53	3
Me	Br	H	H			-0.11	-0.48	2
				>350		-0.11	-0.48	3
Me	Me	H	H			-0.12	-0.48	2
				>350		-0.17	-0.53	3
Br	Br	H	H			-0.05	-0.42	2
				>300		-0.05	-0.42	3
Cl	H	H	H	>300		-0.09	-0.55	3
Cl	Cl	H	H	>400		-0.06	-0.47	3
Me	Me	OMe	OMe	>400		-0.12	-0.45	3

1. A.Anmüller, S.Hünig, *Liebig Ann.* **1986**, 142. (CH_2Cl_2/Bu_4NBF_4/Pt vs. Ag/AgCl/CH_3CN)
2. J.M.Pingarron, et al., *Synth. Metals* **1993**, *55-57*, 1717.
   (RT, scan speed 20mV/s, E vs. SCE, Bu_4NPF_6 in acetonitrile)
3. A.Gonzalez, et al., *Tetrahedron Lett.* **1993**, *49*, 4881.
   (scan speed 20 mV/s, E vs. SCE, Bu_4NClO_4 in acetonitrile)



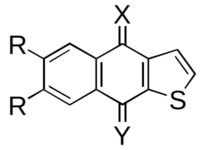
R_1	R_2	R_3	R_4	m.p.	UV-VIS	E_1	E_2	ref.
H	H	H	H			-0.18	-0.48	1
OMe	H	H	H	266-267	491,405,313, 254	-0.12	-0.31	1
						-0.12	-0.31	2
OMe	H	OMe	OMe	270-272	501,419,360, 266,241	-0.11	-0.29	1
						-0.11	-0.29	2
Me	Me	H	H	284-286	442,363,317, 260,228	-0.17		1
Cl	Cl	H	H	240-242		+0.16		1

1. N.Martin, et al., *J. Org. Chem* **1995**, *40*, 4007.
   (vs. Ag wire as Ag/Ag+ quasireference electrode; electrolyte Bu_4NClO_4; in MeCN; scan rate 20mV/s)
2. J.M.Pingarron, et al., *Synth. Metals* **1993**, *55-57*, 1717.
   (RT, scan speed 20mV/s, E vs. SCE, Bu_4NPF_6 in acetonitrile)



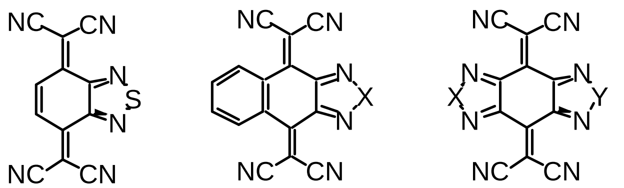
X	UV-VIS	E_1	E_2	ref.
NCN		-0.23	-0.54	1
$C(CN)_2$	230,296,348	-0.34		1

1. N.Martin, et al., *J. Org. Chem* **1997**, *62*, 870-877.
   (SCE vs. Pt; electrolyte $Bu_4N^+ClO_4$; Sol. CH_2Cl_2; scan rate 200mV/s)



X	Y	R	mp	UV-VIS	E_1	E_2	ref.
O	O	H	232-233	325(3.78), 280(4.19), 272.6(4.13), 250.0(4.44), 255.4(4.41), 214.9(4.69)	-0.78	-1.42	1
O	O	Cl	247-248	329 (4.0)	-0.53	-1.12	1
$C(CN)_2$	O	H	246-248	382(4.2), 326(4.0), 297(4.2), 282(4.2, 229(4.3)	-0.33	-0.64	1
$C(CN)_2$	$C(CN)_2$	H	363-364	374(4.4), 318(4.0), 280(4.2), 216(5.0)	-0.18 (2e)		1
$C(CN)_2$	$C(CN)_2$	Cl	>300	382(4.2), 326(4.0), 297(4.2), 282(4.2), 229(4.3)	-0.10 (2e)		1
NCN	NCN	H	290-291	354(4.2), 266(4.1), 225(4.0)	-0.11	-0.61	1
NCN	NCN	Cl	>300	360(4.4), 285(4.3), 275(4.3)	-0.04	-0.50	1
$C(CN)_2$	NCN	H	204-205	365(4.0)305(3.4), 270(3.9), 226(4.0)	-0.07	-0.31	1

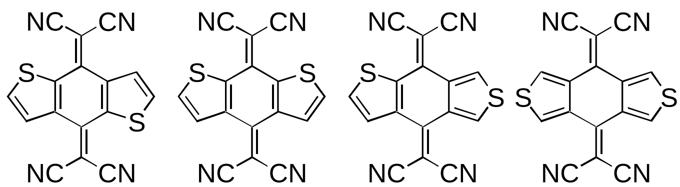
1. C.Seoane, et al., *J. Org. Chem.* **1992**, *57*, 6192.
(Scan rate 20 mV/s, E vs. SCE, 0.1 M TBA•ClO_4 in acetonitrile)



a **b** **c**

	X	Y	E_1	E_2	ref.
a			+0.12	-0.38	1
b	S		-0.21	-0.38	2
b	Se		-0.32	-0.43	1
c	S	S	-0.02	-0.49	2
			-0.22	-0.49	3
c	S	Se	-0.12	-0.55	4
c	Se	Se	-0.23	-0.55	4

1. T.Suzuki, et al., *Chem. Lett.* **1987**, 1129.
(saturated calomel electrode in acetonitrile containing tetrabutlammonium scan rate 100mV/s)
2. Y.Yamashita, et al., *J.C.S. Chem. Commun.* **1985**, 1044.
(saturated calomel electrode in acetonitrile containing tetrabutlammonium scan rate 100mV/s)
3. T.Suzuki, et al., *Chem. Lett.* **1986**, 715
(Scan rate 100mV/s, E vs. SCE, 0.1 M Et_4NClO_4 in acetonitrile)
4. T.Suzuki, et al., *Chem. Lett.* **1987**, 2285.
(saturated calomel electrode in acetonitrile containing tetrabutlammonium scan rate 100mV/s)

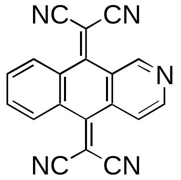


a **b** **c** **d**

	E_1	E_2	ref.
a	+0.03	-0.24	1

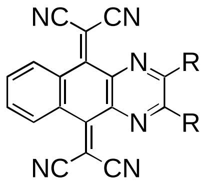
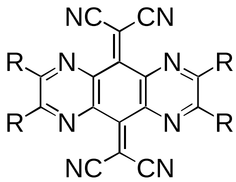
b		+0.01	-0.25	1
c		-0.24	-0.45	1
d		-0.59	-0.77	1

1. K.Kobayashi, et al., *Bull. Chem. Soc. Jpn.* **1992**, *65*, 2168.
(saturated calomel electrode in acetonitrile containing tetrabutlammonium scan rate 100mV/s)



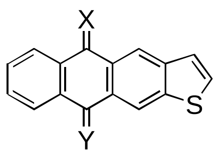
	E_1	E_2	ref.
	-0.24(2e)		1

1. J.L.Marco, et al., *Synth. Metals* **1991**, *41-43*, 1873.
(Scan rate 20 mV/s, E vs. SCE, 0.1 M Bu_4NPF_6 in acetonitrile)


a

b

	R	mp	UV-VIS	E_1	E_2	ref.
a	H	>260	350(4.36),295(4.05)	-0.23	-0.32	1
a	Me	>230	352(4.40),296(4.29), 218(4.34)	-0.27	-0.39	1
a	Ph	292-294	370(4.49),318(4.35), 277(4.20,sh),227(4.54), 216(4.54)	-0.22	-0.31	1
b	Me	>200	398(4.60),382(4.53,sh), 318(4.44), 307(4.25, sh), 262(3.81, sh),238(4.27)	-0.10	-0.54	1
b	Ph	336-340	435(4.37, sh), 398(4.56), 295(4.30),239(4.59), 216(4.52)	+0.01	-0.38	1

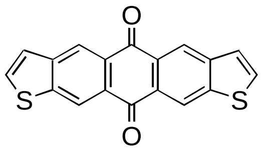
1. T.Suzuki, et al., *Chem. Lett.* **1986**, 715.
(saturated calomel electrode in acetonitrile containing tetrabutlammonium scan rate 100mV/s)



X	Y	mp	UV-VIS	E_1	E_2	ref.
O	O	250-252	390(2.4),383.1(2.34), 282.1(3.20), 250.0(3.20)	-0.93	-1.50	1
NCN	NCN	270-272	390(4.2),283(4.9),250(4.9)	-0.33	-0.68	1
$C(CN)_2$	$C(CN)_2$	>400	319(3.9),295(3.9),264(3.7)	-0.37(2e)		1
$C(CN)_2$	O	274-276	407(3.0), 229(3.6), 255(3.7)			1

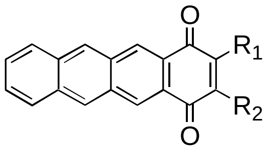
1. C.Seoane, et al., *J. Org. Chem.* **1992**, *57*, 6192.

(Scan rate 20 mV/s, E vs. SCE, 0.1 M TBA•ClO4 in acetonitrile)



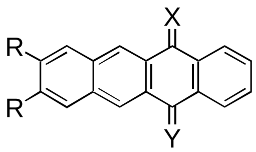
	mp	UV-VIS	E_1	E_2	ref.
	247-248	390.0(4.16), 293.3(4.90), 246.7(4.60)	-0.97	-1.49	1

1. C.Seoane, et al., *J. Org. Chem.* **1992**, *57*, 6192.
(Scan rate 20mV/s, E vs. SCE, 0.1 M TBA•ClO4 in acetonitrile)



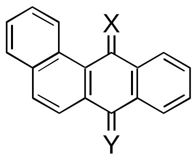
R_1	R_2	mp	UV-VIS	E_1	E_2	ref.
Me	Me	308-310		-0.82	-1.25	1
OMe	H	>350		-0.72	-1.20	1

1. A.Gonzalez, et al., *Tetrahedron Lett.* **1993**, *49*, 4881.
(Scan speed 20 mV/s, E vs. SCE, TBA•ClO4 in acetonitrile)



X	Y	R	mp	UV-VIS	E_1	E_2	E3	ref.
NCN	NCN	H	>250	----------	-0.32	-0.62		1
O	NCN	H	218-219	----------				1
$C(CN)_2$	$C(CN)_2$	H	>320	262,302,326,425	-0.44	-0.89	-1.85	2
$C(CN)_2$	$C(CN)_2$	OMe	>320	240(sh),305,360,440	-0.44	-0.89	-1.59	2

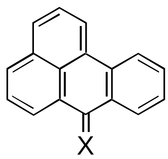
1. F.H.Cano, et al., *J. Org. Chem.* **1992**, *57*, 5726. (E vs. Ag/AgCl, 0.1 M TBA•ClO4 in CH_2Cl_2)
2. R.Behnisch, et al., *J. Org. Chem.* **1989**, *54*, 2563. (E vs. SCE, 0.1 M TBA•ClO4 in MeCN)



X	Y	mp	UV-VIS	E_1	E_2	ref.
NCN	NCN	> 250		-0.21	-0.48	1a
				-0.05	-0.46	1b
O	NCN	200-201				1
NCN	$C(CN)_2$	299-301		-0.27		1b

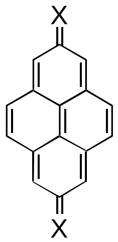
				-0.21		1a
O	$C(CN)_2$	237-238	255,285,320 370(sh),430(sh)	-0.49	-0.57	2
$C(CN)_2$	$C(CN)_2$	> 300	231(4.29),285(4.19) 337(4.46),431(3.46)	-0.44(2e)		3

1. F.H.Cano, et al., *J. Org. Chem.* **1992**, *57*, 5726.
(Scan rate 100 mV/s, E vs. Ag/AgCl, 0.1 M TBA•ClO_4 in (a) dimethylformamide, (b) dichloromethane)
2. R.Behnisch, et al., *J. Org. Chem.* **1989**, *54*, 2563.
(E vs. SCE, TBA•ClO_4 in acetonitrile)
3. K.Maruyama, et al., *Bull. Chem. Soc. Jpn.* **1989**, *62*, 1626.



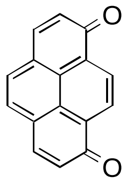
X	mp	UV-VIS	E_1	E_2	ref.
NCN	291-293		-0.77		1

1. F.H.Cano, et al., *J. Org. Chem.* **1992**, *57*, 5726.
(Scan rate 100mV/s, E vs. Ag/AgCl, 0.1 M TBA•ClO_4 in dichloromethane)

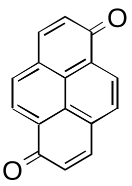


X	mp	UV-VIS	E_1	E_2	E_{ox1}	E_{ox2}	ref.
$C(CN)_2$			-0.032	-0.342			1
					+0.010	+0.325 (irr.)	2a
					+0.075	+0.340 (irr.)	2b
					+0.040	+0.340 (irr.)	2c
					+0.160	+0.530 (irr.)	2d
	>360	243(4.60),340(3.31) 557(4.12)			-0.278	+0.026 (irr.)	3

1. A.N.Bloch, et al., *J. Org. Chem.* **1985**, *50*, 1789.
(E vs. Ag/$AgNO_3$, 0.1 M TBA•BF_4 in buthylonitrile)
2. J.Schwarz, et al., *J. Org. Chem.* **1982**, *47*, 1011.
(a) Oxidation of dianion, E vs. Ag/AgCl, 0.1 M $LiClO_4$ in acetonitrile
(b) Oxidation of dianion, E vs. Ag/AgCl, 0.1 M TBA•ClO_4 in acetonitrile
(c) Oxidation of dianion, E vs. Ag/AgCl, 0.1 M TBA•ClO_4 in dimethylformamide
(d) Oxidation of dianion at –23°C, E vs. Ag/AgCl, 0.1 M TBA•ClO_4 in dimethylformamide
3. A.N.Bloch, et al., *J.C. S. Chem. Commun.* **1980**, 947.
(Oxidation of dianion, E vs. Ag/$AgNO_3$, 0.1 M TBA•BF_4 in buthylonitrile)



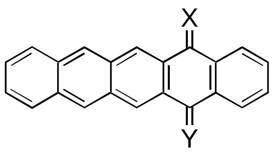
a



b

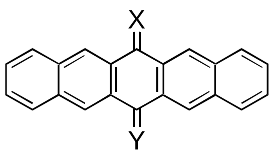
	mp	UV-VIS	E_1	E_2	ref.
a			-0.44	-0.80	1
b			-0.44	-0.79	1

1. K.Nakasuji, et al., *J. Am. Chem. Soc*, **1991**, *113*, 1862.
(V vs. SCE in n-Bu_4NClO_4/benzonitrile)



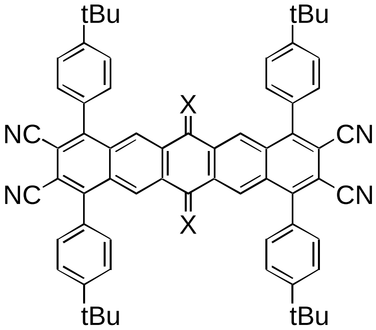
X	Y	mp	UV-VIS	E_1	E_2	E_3	ref.
$C(CN)_2$	$C(CN)_2$	> 320	250,288,332,365,505-0.50	-0.92	-1.54	1	

1. R.Behnisch, et al., *J. Org. Chem.* **1989**, *54*, 2563.
(E vs. SCE, 0.1 M TBA•ClO_4 in acetonitrile)



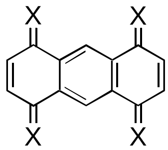
X	Y	mp	UV-VIS	E_1	E_2	E_3	ref.
O	O			-1.08	-1.62		1
NCN	NCN	> 250		-0.43	-0.67		2
NCN	O	240(dec)					2
$C(CN)_2$	$C(CN)_2$	> 320	249,322,415	-0.57	-0.91	-1.61	3
		> 320	249,322,415	-0.57	-0.91		4

1. T.H.Jozefiak, et al., *J. Org. Chem.* **1988**, *53*, 5007.
(E vs. SCE, 0.1 M TBA•BF_4 in dimethylformamide)
2. F.H.Cano, et al., *J. Org. Chem.* **1992**, *57*, 5726.
(E vs. SCE, 0.1 M TBA•BF_4 in dichloromethane)
3. R.Behnisch, et al., *J. Org. Chem.* **1989**, *54*, 2563.
(E vs. SCE, 0.1 M TBA•ClO_4 in acetonitrile)
4. N.Martin, M.Hanack, *J.C.S. Chem. Commun.* **1988**, 1522.
(E vs. SCE, 0.1 M TBA•ClO_4 in acetonitrile)



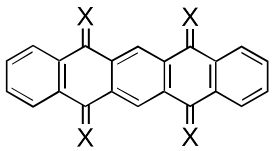
X	UV-VIS	E_1	E_2	ref.
O	425 (4.22),282(4.97)	-0.56	-1.09	1
$C(CN)_2$	432(4.19),328(4.75),292(4.94)	-0.27(2e)		1

1. T.H.Jozefiak, et al., *J. Org. Chem.* **1988**, *53*, 5007.
(E vs. SCE, 0.1 M TBA•BF4 in dimethylformamide)



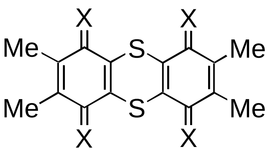
X	E_1	E_2	E_3	ref.
$C(CN)_2$	0.26	0.05	-0.44	1

1. T.Mitsuhashi, et al., *J.C.S. Chem.Commun.* **1987**, 810-812
(in MeCN; Et_4NClO_4; *vs*. SCE)



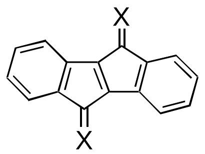
X	UV-VIS	E_1	E_2	E_3	E_4	ref.
NCN	287(4.46),345(4.25)	+0.10	-0.15	-0.91	-1.11	1

1. C.A.Liberko, et al., *Synth. Metals* **1991**, *41-43*, 2365.
(E vs. SCE, 0.1 M TBA•BF4 in dimethylformamide)



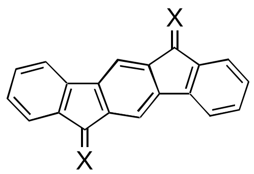
X	mp	E_1	E_2	E_3	E_4	ref.
O	>400	-0.32	-0.63	-1.15		1
NCN	205-207	0.35	0.15	-0.31	-0.50	1

1. M.Gonzalez, et al., *Adv. Mater*. **1994**, *6*, 765.
(V vs SCE; in CH_2Cl_2; scan rate 20mV/s)



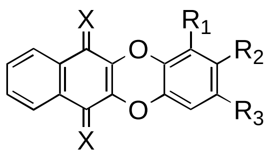
X	mp	UV-VIS	E_1	E_2	E_{ox1}	E_{ox2}	ref.
CH(NMe2)	190(dec)	441(4.70)			+0.08(2e)		1
$C(NMe_2)_2$	239-240	----			-0.44	-0.26	1
BenzoThiaMethylamino	279-280	548(4.70)			-0.06(2e)		1
$C_3H_2S_2$	260-262	518			+0.42(2e)		1
1,3-dithiolanylidene	301-302	430			+0.68(2e)		1
NCN	>330	650,384	+0.14	-0.33			1

1. W.Frank, R.Gompper, *Tetrahedron Lett.* **1987**, *28*, 3083.
(E vs. SCE, 0.1 M TEA•BF_4 in acetonitrile)



X	mp	UV-VIS	E_1	E_2	E3	E4	ref.
$C(CN)_2$	>330	207,309, 382,405	-0.04	-0.27	-0.82	-1.24	1
O			-0.69	-1.04	-1.26	-1.94	1

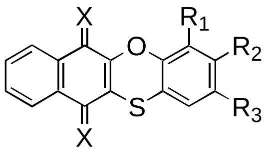
1. W.Frank, R.Gompper, *Tetrahedron Lett.* **1987**, *28*, 3083.
(E vs. SCE, 0.1 M TEA•BF_4 in dimethylformamide)



X	R_1	R_2	R_3	mp	UV-VIS	E_1	E_2	ref.
O	H	H	H	286-288		-0.51	-1.21	1a
O	OMe	H	H	274-275		-0.46	-1.15	1a
O	H	Me	H	297-298.5		-0.49	-1.19	1a
O	Me	H	H	244-245		-0.51	-1.20	1a
O	tBu	H	H	188-190		-0.50	-1.18	1a
O	tBu	H	tBu	161-163.5		-0.49	-1.23	1a
O	H	OMe	OMe	>310				1*
O	H	NO	H	>320		-0.35	-1.06	1a
O	H	CN	H	308-310.5		-0.41	-1.13	1a
NCN	H	H	H	>300.5		+0.07	-0.44	1b
NCN	OMe	H	H	292		-0.04	-0.42	1b
NCN	H	Me	H	>300		+0.02	-0.45	1b
NCN	Me	H	H	>300		+0.02	-0.45	1b
NCN	tBu	H	H	265.5		-0.03	-0.43	1b
NCN	tBu	H	tBu	188.5		+0.02	-0.43	1b
NCN	H	OMe	OMe	>300				1*
NCN	H	NO_2	H	> 300		+0.17	-0.34	1b
NCN	H	CN	H	> 300		+0.11	-0.38	1b

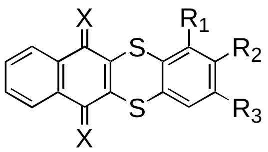
1. J.Bernstein, et al., *J. Org. Chem.* **1991**, *56*, 1569.

(Scan rate 100mV/s, E vs. Ag/AgCl, 0.1 M TBA•ClO4 in (a) dimethylformamide,
(b) dichloromethane)
(*: Insoluble in any solvent)



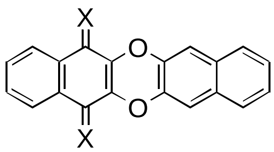
X	R1	R2	R3	mp	UV-VIS	Eox	E1	E2	ref.
O	H	H	H	----	548 (2.97)	+1.52	-0.59	-1.09	1
				256-258	548	+1.52	-0.59	-1.09	2
NCN	H	H	H	----	669 (3.05)	+1.55	+0.03	-0.41	1
				>300	699	+1.64	+0.03	-0.42	2
NCN	H	Me	H	>300	692	+1.54	+0.02	-0.43	2
NCN	H	H	Me	>300	688	+1.56	+0.02	-0.44	2
NCN	Me	H	Me	>300	717	+1.51	0.00	-0.42	2
$C(CN)_2$	H	H	H	----	594 (3.42)	+1.57	0.00(2e)		1

1. P.Bando, et al., *Synth. Metals* **1993**, *55-57*, 1721.
(RT, Scan rate 20mV/s, E vs. SCE, 0.1 M Bu_4NPF_6 in dichloromethane)
2. N.Martin, et al., *J. Org. Chem* **1996**, *61*, 3041.
(SCE vs. Pt ; electrolyte $Bu_4N^+ClO_4$; in CH_2Cl_2; scan rate 50mV/s)



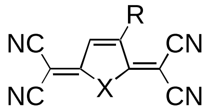
X	R1	R2	R3	mp	UV-VIS	Eox	E1	E2	ref.
O	H	H	H	----	542(2.94)	+1.41	-0.53	-1.08	1
				288-290	542	+1.41	-0.53	-1.09	2
NCN	H	H	H	----	628(3.94)	+1.50	+0.05	-0.36	1
				>300	628	+1.51	+0.05	-0.36	2
NCN	H	Me	H	>300	644	+1.43	+0.05	-0.34	2
$C(CN)_2$	H	H	H	----	515(3.35)	+1.38	-0.04 (2e)		1

1. P.Bando, et al., *Synth. Metals* **1993**, *55-57*, 1721.
(RT, Scan rate 20mV/s, E vs. SCE, 0.1 M Bu_4NPF_6 in dichloromethane)
2. N.Martin, et al., *J. Org. Chem* **1996**, *61*, 3041.
(SCE vs. Pt ; electrolyte $Bu_4N^+ClO_4$; in CH_2Cl_2; scan rate 50mV/s)



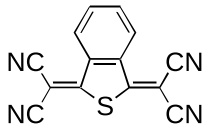
X	mp	UV-VIS	E1	E2	ref.
O	>320		-0.53	-1.15	1a
NCN	>300		-0.03	-0.44	1b

1. J.Bernstein, et al., *J. Org. Chem.* **1991**, *56*, 1569.
(Scan rate 100mV/s, E vs. Ag/AgCl, 0.1 M TBA・ClO4 in (a) dimethylformamide, (b) dichloromethane)

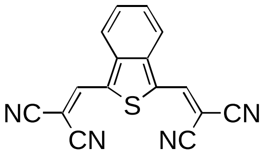


X	R	E_1	E_2	ref.
S	H	+0.07	-0.54	1
S	n-C_6H_{13}	-0.06	-0.57	4
Se	H	+0.03	-0.54	2
O	H	+0.03	-0.55	3

1. K.Yui, et al., *Bull. Chem. Soc. Jpn.* **1989**, *62*, 1539.
(Ag/AgCl, Pt electrode in CH_2Cl_2 containing tetrabutlammonium scan rate 100mV/s)
2. K.Yui, et al., *Chem. Lett.* **1988**, 1179.
(Ag/AgCl,Pt electrode in CH_2Cl_2 containing tetrabutlammonium scan rate 100mV/s)
3. H.Ishida, et al., *Bull. Chem. Soc. Jpn.* **1990**, *63*, 2828.
(Ag/AgCl,Pt electrode in CH_2Cl_2 containing tetrabutlammonium scan rate 100mV/s)
4. H.Higuchi, et al., *Bull. Chem. Soc. Jpn.* **1995**, *68*, 2363.
(Pt vs. Ag/AgCl; Bu_4NClO_4; in CH_2Cl_2; Scan rate 100mV/s)



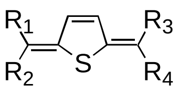
a



b

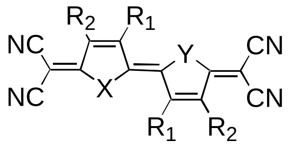
	mp	UV-VIS	E_1	E_2	ref.
a	254	408	0.31	-0.78	1
b	305	540	-0.25	-0.62	1

1. D.Lorcy, et al., *J.C.S. Chem. Commun.* **1993**, 345-347.
(*vs.* Ag/AgCl; $Bu_4N^+PF_6$; in CH_2Cl_2; Scan rate 100mV/s)



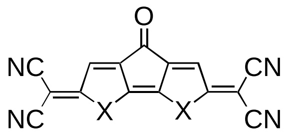
R_1	R_2	R_3	R_4	mp	UV-VIS	E_1	E_2	ref.
SEt	SEt	SEt	SEt	70	427	-1.85		1
SEt	CN	CN	SEt	67	446,282	-0.99		1
CN	SEt	CN	SEt	114-115	417,305	-0.99		1
CN	CN	CN	CN	179	421,400,327	+0.04		1

1. **岩月章治、久保雅敬、溝口　隆、日本化学会誌**, **1992**, *3*, 335.
(Ag/AgCl; $Bu_4N^+ClO_4$: Solvent. CH_2Cl_2)



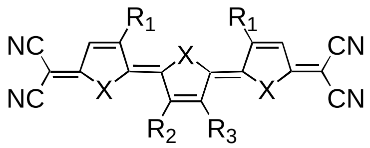
X	Y	R_1	R_2	mp	UV-VIS	E_1	E_2	ref.
S	S	H	H	179	421,400,327	-0.04	-0.26	1
						-0.03	-0.26	2
S	S	Cl	H			+0.18	-0.06	2
S	S	Br	H			+0.20	+0.03	2
S	S	Br	Br			+0.28	+0.13	2
S	S	n-C_6H_{13}	H			-0.34	-0.34	3
O	O	H	H			-0.09	-0.31	4
						+0.20	-0.12	5
O	O	Br	H			+0.08	-0.12	4
O	O	Cl	H			+0.35	+0.04	5
S	Se	H	H			-0.07	-0.30	6
S	Se	Cl	H			+0.16	-0.09	6
S	Se	Br	H			+0.11	-0.10	6
Se	Se	H	H			-0.05	-0.25	7
Se	Se	Br	H			+0.15	-0.08	7

1. K.Takahashi, S.Tarunani, *J.C.S. Chem. Commun*. **1994**, 519.
   (V *vs* SCE; solvent CH_2Cl_2; Bu_4NClO_4; Scan rate 50mV/s)
2. K.Yui, et al., *Bull. Chem. Soc. Jpn.* **1989**, *62*,1539.
   (Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)
3. H.Higuchi, et al., *Bull. Chem. Soc. Jpn.* **1995**, *68*, 2363.
   (Pt vs. Ag/AgCl; Bu_4NClO_4; in CH_2Cl_2; Scan rate 100mV/s)
4. H.Ishida, et al., *Bull. Chem. Soc. Jpn.* **1990**, *63*, 2828.
   (Ag/AgCl, Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)
5. K.Takimiya, T.Yanagimoto, T.Yamamoto, F.Ogura, T.Otsubo
   (in 0.1M Bu_4NClO_4 inbenzonitrile Ag/AgCl standard and Pt working electorode 100mV/s)
6. S.Yoshida, K.Yui, Y.Aso, T.Otsubo, F.Ogura, unpublished results.
   (Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)
7. K.Yui, et al., *Chem. Lett.* **1988**, 1179.
   (Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)



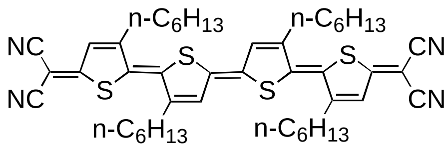
X	Solvent	mp	UV-VIS	E_1	E_2	ref.
S	CH_2Cl_2,$CHCl_3$,Acetone,MeCN			0.04	-0.27	1
Se	CH_2Cl_2,$CHCl_3$,Acetone,MeCN			-0.06	-0.35	2

1. K.Takahashi, S.Tarunani, *J.C.S.Chem. Commun.* **1998**, 1233.
   (V *vs* SCE; solvent CH_2Cl_2; Bu_4NClO_4; scan rate $50mVs^{-1}$, room temperature)
2. K.Takahashi, S.Tarunani, in Abstract of 12th Symposium on Structual Organic Chemistry P 325 (1996).
   (V *vs* SCE; solvent CH_2Cl_2; Bu_4NClO_4; scan rate $50mVs^{-1}$, room temperature)



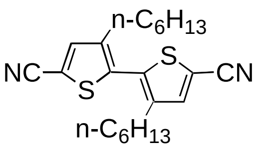
X	R_1	R_2	R_3	mp	UV-VIS	E_1	E_2	ref.
O	H	H	H			-0.03	-0.26	1
O	Br	H	H			+0.20	+0.03	1
O	Br	Br	Br			+0.28	+0.13	1
O	Br	$C(CN)_2$	Br			+0.21	-0.01	1
S	H	H	H			-0.03	-0.03	2

1. H.Ishida, et al., *Bull. Chem. Soc. Jpn.* **1990**, *63*, 2828.
(Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)
2. K.Yui, et al., *Bull. Chem. Soc. Jpn.* **1989**, *62*,1539.
(Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)

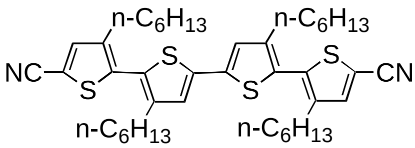


	E_1	E_2	ref.
	-0.07	-0.18	1

1. H.Higuchi, et al., *Bull. Chem. Soc. Jpn.* **1995**, *68*, 2363.
(Pt vs. Ag/AgCl; $Bu_4N^+ClO_4$; Sol. CH_2Cl_2; Scan rate 100mV/s)



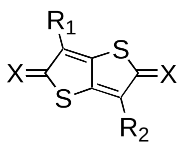
a



b

	E_1	E_2	ref.
a	-1.76	-1.88	1
b	-1.83	-1.95	1

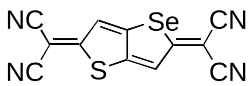
1. H.Higuchi, et al., *Bull. Chem. Soc. Jpn.* **1995**, *68*, 2363.
(Pt vs. Ag/AgCl; $Bu_4N^+ClO_4$; Sol. CH_2Cl_2; Scan rate 100mV/s)



X	R_1	R_2	mp	UV-VIS	E_1	E_2	ref.
O	Me	Me	152		-0.70	-1.23	1
O	SMe	Me	126		-0.56	-1.08	1
O	Me	H	98		-0.49	-1.07	1
O	SMe	SMe	152		-0.44	-0.92	1
O	H	H	166		-0.49	-1.07	1

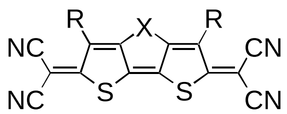
O	Cl	Me	167	-0.46	-1.02	1
O	Br	Me	197	-0.46	-1.01	1
O	Br	SMe	157	-0.35	-0.85	1
O	Br	H	152	-0.36	-0.92	1
O	Br	Br	225	-0.24	-0.81	1
O	I	I	248	-0.26		1
NCN	H	H	195	+0.10	-0.33	1,2
NCN	Me	H	165	+0.01	-0.42	1,2
NCN	Me	Me	230	-0.05	-0.46	1,2
NCN	SMe	Me	242	+0.01	-0.38	1,2
NCN	SMe	SMe	262	+0.09	-0.28	1,2
NCN	Cl	Me	192	+0.12	-0.31	1,2
NCN	Br	H	226	+0.21	-0.23	1,2
NCN	Br	Me	237	+0.12	-0.32	1,2
NCN	Br	SMe	240	+0.18	-0.22	1,2
NCN	Br	Br	272	+0.30	-0.14	1,2
NCN	I	I	246	+0.29	-0.14	1,2
$C(CN)_2$	H	H		+0.06	-0.36	3
$C(CN)_2$	Br	H		+0.25	-0.13	3

1. E.Gunther, S.Hunig, *Chem Ber* **1992**, *125*, 1235.
(Pt *vs*. Ag/AgCl; Solvent. CH_2Cl_2)
2. E.Gunther, S.Hunig, *Chem. Ber.* **1992**, *125*, 1919.
(Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)
3. K.Yui, et al., *Bull. Chem. Soc. Jpn.* **1989**, *62*, 1547.
(Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)



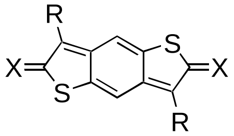
	E1	E2	ref.
	+0.02	-0.36	1

1. S. Yoshida, K.Yui, Y. Aso, T.Otsubo, F. Ogura, unpublished results.
(Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)



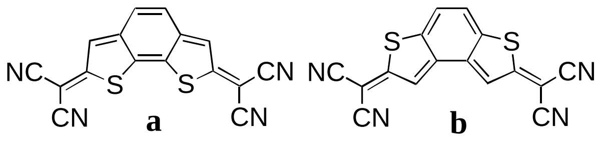
X	R	E_1	E_2	ref.
S	H	+0.05	-0.23	1
S	Br	+0.16	-0.11	1
SO_2	H	+0.28	-0.05	1

1. K.Yui, et al., *Bull. Chem. Soc. Jpn.* **1989**, *62*, 1547.
(Ag/AgCl,Pt electrode in dichloromethane containing tetrabutlammonium scan rate 100mV/s)



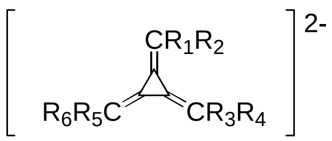
X	R	mp	UV-VIS	E_1	E_2	ref.
O	Br			-0.04		1
O	Cl			-0.06		1
$C(CN)_2$	H			+0.20	-0.05	2

1. M.Nakatsuka, et al., *Chem. Lett.* **1983**, 905.
(V vs. SCE., in benzoquinone with 0.1 M Bu_4NBF_4)
2. S.Yoshida, et al., *J. Org. Chem.* **1994**, *59*, 3077.
(Ag/AgCl, Pt electrode in N,N-dimethylformamide containing tetrabutylammonium, scan rate 100mV/s)



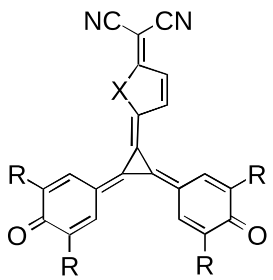
	E_1	E_2	ref.
a	+0.15	-0.15	1
b	+0.25	-0.03	1

1. S.Yoshida, et al., *J. Org. Chem.* **1994**, *59*, 3077.
(Ag/AgCl, Pt electrode in benzonitrile containing tetrabutylammonium, scan rate 100mV/s)



R_1	R_2	R_3	R_4	R_5	R_6	UV-VIS	E_1	E_2	ref.
CN	CN	CN	CN	CN	CN	315, 285, 222	0.34	1.13	1
CN	CN	CN	CN	CN	COOMe	322, 293, 224	0.26	1.0	1
CN	CN	CN	CN	COOMe	COOMe	322, 269, 223	0.11(irr)		1
CN	CN	CN	COOMe	CN	COOMe	326, 302, 227	0.17	0.97	1
CN	COOMe	CN	COOMe	CN	COOMe	328, 305, 232	0.10	0.72	1
CN	CN	COOMe	COOMe	COOMe	COOMe	315, 268	0.06	0.46	1
CN	COOMe	CN	COOMe	COOMe	COOMe	320, 305, 234	0.05	0.44	1
CN	COOMe	COOMe	COOMe	COOMe	COOMe	314, 300, 240	-0.01	0.32	1
COOMe	COOMe	COOMe	COOMe	COOMe	COOMe	309, 264	-0.07	0.16	1

1. T.Fukunaga, *J. Am. Chem. Soc.* **1976**, 610.
(in MeCN, vs. SCE)

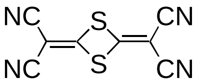


X	R	Solvent	E_1	E_2	ref.

S	*t*Bu	CH_2Cl_2, $CHCl_3$, Benzene, MeCN	0.20	-0.12	1
S	Me	CH_2Cl_2, $CHCl_3$, Benzene, MeCN	0.26	0.01	1
Se	*t*Bu	CH_2Cl_2, $CHCl_3$, Benzene, MeCN	0.19	-0.13	2
Te	*t*Bu	CH_2Cl_2, $CHCl_3$, Benzene, MeCN	0.17	-0.14	3

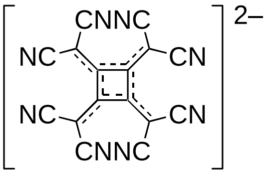
1. K.Takahashi, S.Tarunani, *J.C.S. Chem. Commun.* **1994**, 519.
2. K.Takahashi, S.Tarunani, *Synth Metals* **1995**, *70*, 1165.
   K.Takahashi, S.Tarunani, *Adv. Mater.* **1995**, *7*, 639.
   K.Takahashi, S.Tarunani, *Mol. Cryst. Liq. Cryst.* **1997**, *296*, 145.
3. S.Tarutani, et al., *Chem. Lett.* **1997**, 627.

(V *vs* SCE; solvent CH_2Cl_2; Bu_4NClO_4; scan rate $50mVs^{-1}$, room temperature)

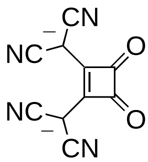


	E_1	E_2	ref.
	-0.62		1

1. N.F.Haley, *J.C.S. Chem. Commun.* **1977**, 207.
   (saturated calomel electrode in acetonitrile containing tetrabutlammonium scan rate $100mVs^{-1}$)



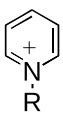
a



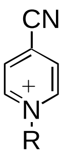
b

	UV-VIS	E_1	E_2	ref.
a	400	1.25	>2.1	1
b	380	0.95	1.77	1

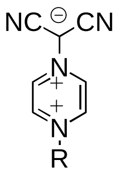
1. T.A.Blinka, R.West, *Tetrahedron Lett.* **1983**, *24*, 1567.
   (in MeCN, vs. SCE)



a



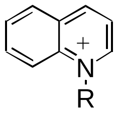
b



c

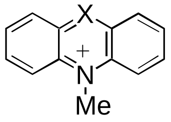
	R	E_1	E_2	ref.
a	Me	-1.28		1
a	Et	-1.36		1
b	Me	-0.70		1
b	Et	-0.76		1
c	?	-0.25		1

1. H. Tanaka, et al., *Bull. Chem. Soc. Jpn.* **1984**, *57*, 2198. (V vs. SCE)



R	E_1	E_2	ref.
Me	-0.86		1
Et	-0.92		1

1. H. Tanaka, et al., *Bull. Chem. Soc. Jpn.* **1984**, *57*, 2198. (V vs. SCE)



X	E_1	E_2	ref.
CH	-0.41		1
N	-0.11		1

1. H. Tanaka, et al., *Bull. Chem. Soc. Jpn.* **1984**, *57*, 2198. (V vs. SCE)