

LAMPIRAN

Lampiran 1. Perhitungan Massa Zinc Acetat Dyhidrat dan Copper Chlorid Dyhidrat

Massa Zinc Acetat Dyhidrat

- ❖ Membuat larutan *Zinc Acetat Dyhidrat* 10 mL dengan molaritas 0,4 M
- ❖ Diketahui : Mr *Zinc Acetat Dyhidrat* = 219,49 gr/mol

$$\text{Molaritas (M)} = \frac{\text{gr}}{\text{Mr}} \times \frac{\text{V}}{\text{mL}}$$

- ❖ ZnO 0,4 M

$$0,4 \text{ M} = \frac{\text{gr}}{219,49} \times \frac{1000}{10}$$

$$\text{gr} = 0,87796$$

Massa Zinc Acetat Dyhidrat + Copper Chlorid Dyhidrat untuk larutan CZO 0,4M

- ❖ Diketahui : gr Zinc Acetat Dyhidrat 0,4 M = 0,87796
gr Copper Chlorid Dyhidrat 0,4 M = 0.5376
Mr Copper Chlorid Dyhidrat = 134,4

- ❖ Cu 1,5%

$$1,5\% \times 0,5376 \text{ Copper Chlorid Dyhidrat} = 0,008064 \text{ gr}$$

$$98,5\% \times \text{Zinc Acetat Dyhidrat } 0,87796 = 0,864790 \text{ gr}$$

Lampiran 2. Informasi Kartu ICCD

❖ CZO-ITO

Name and formula

Reference code: 00-039-1058

Compound name: Indium Tin Oxide
PDF index name: Indium Tin Oxide

Chemical formula: $\text{In}_2\text{Sn}_2\text{O}_{7-x}$

Crystallographic parameters

Crystal system: Cubic

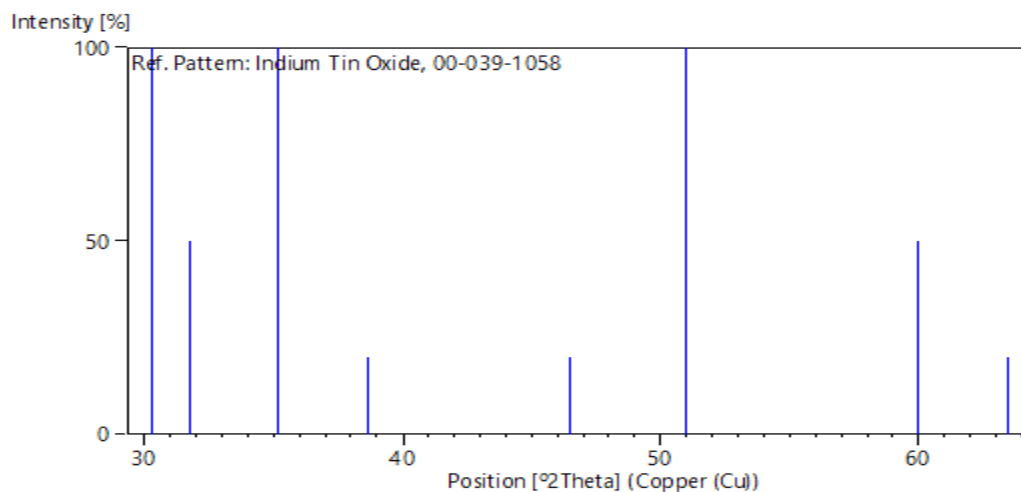
References

Primary reference: Solov'eva, A., Zhdanov, V., *Inorg. Mater. (Engl. Transl.)*, **21**, 828, (1985)

Peak list

No.	h	k	l	d [Å]	2Theta[deg]	I [%]
1	2	2	2	2,95000	30,273	100,0
2	3	2	0	2,81400	31,774	50,0
3	4	0	0	2,55000	35,165	100,0
4	3	3	1	2,32600	38,680	20,0
5	5	1	1	1,95300	46,459	20,0
6	4	4	1	1,79000	50,978	100,0
7	6	2	2	1,54200	59,940	50,0
8	7	0	0	1,46500	63,445	20,0

Stick Pattern



❖ CZO-Glass

Name and formula

Reference code: 01-089-0510

Compound name: Zinc Oxide

ICSD name: Zinc Oxide

Empirical formula: OZn

Chemical formula: ZnO

Crystallographic parameters

Crystal system: Hexagonal

References

Primary reference: *Calculated from ICSD using POWD-12++*

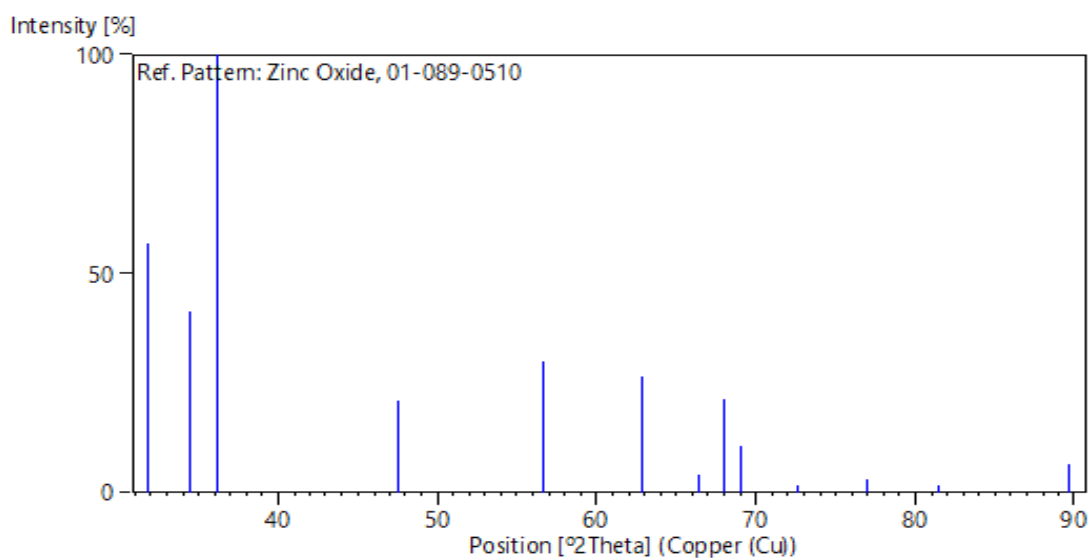
Structure: Sawada, H., Wang, R., Sleight, A.W., *J. Solid State Chem.*, **122**, 148, (1996)

Peak list

No.	h	k	l	d [Å]	2Theta[deg]	I [%]
1	1	0	0	2,81354	31,779	57,1
2	0	0	2	2,60270	34,430	41,4

3	1	0	1	2,47513	36,265	100,0
4	1	0	2	1,91058	47,554	21,0
5	1	1	0	1,62440	56,615	30,1
6	1	0	3	1,47687	62,876	26,4
7	2	0	0	1,40677	66,400	4,0
8	1	1	2	1,37803	67,971	21,4
9	2	0	1	1,35805	69,112	10,5
10	0	0	4	1,30135	72,587	1,6
11	2	0	2	1,23756	76,988	3,2
12	1	0	4	1,18113	81,411	1,6
13	2	0	3	1,09275	89,646	6,5

Stick Pattern



Name and formula

Reference code: 01-079-0207

Mineral name: Zincite, syn

Compound name: Zinc Oxide

ICSD name: Zinc Oxide

Empirical formula: OZn

Chemical formula: ZnO

Crystallographic parameters

Crystal system: Hexagonal

References

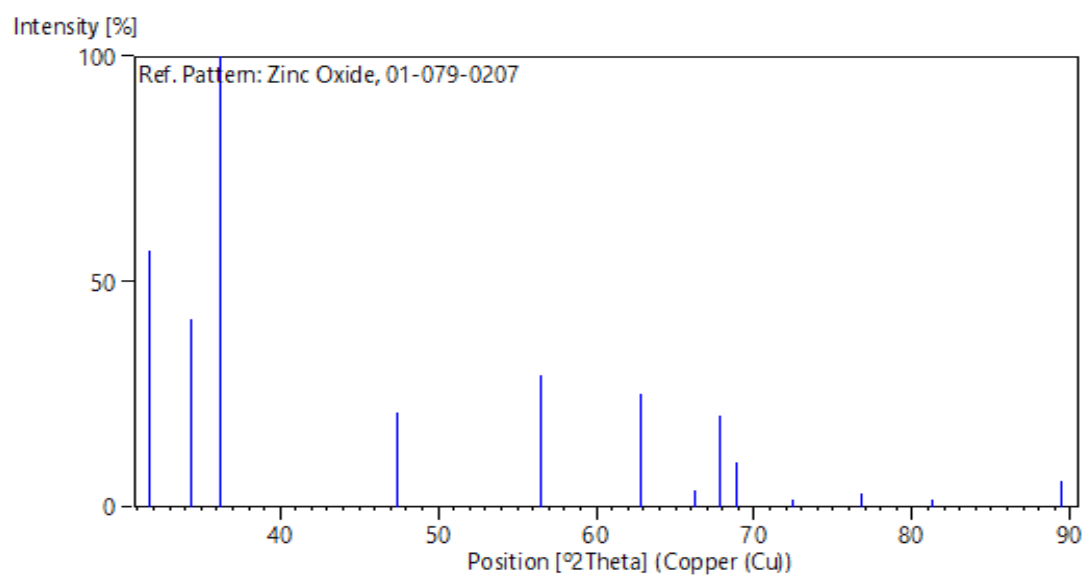
Primary reference: *Calculated from ICSD using POWD-12++*, (1997)

Structure: Albertsson, J., Abrahams, S.C., Kvick, A., *Acta Crystallogr., Sec. B: Structural Science*, **45**, 34, (1989)

Peak list

No.	h	k	l	d [Å]	2Theta[deg]	I [%]
1	1	0	0	2,82049	31,699	57,1
2	0	0	2	2,60626	34,382	41,6
3	1	0	1	2,48062	36,182	100,0
4	1	0	2	1,91416	47,459	21,0
5	1	1	0	1,62841	56,463	29,1
6	1	0	3	1,47933	62,760	25,1
7	2	0	0	1,41024	66,216	3,8
8	1	1	2	1,38101	67,805	20,3
9	2	0	1	1,36130	68,924	10,0
10	0	0	4	1,30313	72,472	1,6
11	2	0	2	1,24031	76,786	3,0
12	1	0	4	1,18297	81,258	1,5
13	2	0	3	1,09497	89,415	5,8

Stick Pattern



Lampiran 3. Ukuran Partikel CZO

CZO 400°C	CZO 450°C	CZO 500°C	CZO 600°C
60	40	60	90
30	40	60	60
50	70	70	60
50	50	60	60
40	40	80	80
50	40	80	70
40	40	60	60
50	50	80	70
10	60	90	80
50	30	90	90
50	70	60	90
50	60	80	60
50	40	70	160
50	50	60	80
30	90	60	90
40	80	50	80
50	40	60	90
60	50	60	90
50	40	90	80
60	50	90	80
50	40	60	90
50	40	60	80
50	40	50	80
30	40	60	60
40	70	60	60
30	50	70	60
50	40	60	70
50	40	70	60
50	40	60	80
50	60	80	110
50	30	80	60
50	70	60	80
30	60	80	90
40	40	90	160

50	50	60	80
40	40	60	70
40	50	50	160
40	40	60	80
50	40	60	70
10	40	70	160
90	40	60	80
110	70	80	160
40	50	70	80
60	40	60	90
50	40	60	80
50	40	50	90
50	50	60	110
30	60	60	160
40	30	50	80
50	70	60	110
10	60	60	160
30	80	70	80
50	40	60	70
50	50	70	80
40	40	60	90
90	70	80	60
110	50	70	70
50	40	60	80
50	40	60	90
40	40	60	60
50	60	80	80
10	30	80	90
90	70	60	90
30	60	80	80
40	70	60	90
30	50	50	60
50	40	50	60
50	40	70	80
50	40	60	110
50	50	60	60
50	60	60	80
50	30	80	70
30	70	80	160
40	50	90	80
40	40	60	70

50	50	60	110
40	40	50	160
10	40	60	80
50	40	60	90
10	40	70	110
50	70	60	160
50	50	70	80
30	40	60	80
40	40	80	90
30	30	80	80
50	70	60	60
50	60	80	80
40	80	90	80
50	40	90	60
50	50	60	60
30	40	80	80
40	70	70	70
40	50	60	80
50	40	60	80
40	40	50	80
40	50	60	90
50	40	60	60
50	40	50	80
50	40	70	90
40	50	70	80
Rata-rata 45,5	Rata-rata 49,1	Rata-rata 66,5	Rata-rata 86,9

Lampiran 4. Tinggi Barrier

❖ CZO 400°C

$$\begin{aligned}\Phi_s &= \frac{kT}{q} \ln \left(\frac{AA^*T^2}{q} \right) \\ &= \frac{8,617 \times 10^5 \times 300}{1,602 \times 10^{19}} \ln \left(\frac{0,0001 \times 32 \times 300^2}{16,019} \right) \\ &= 0,56032 \text{ eV}\end{aligned}$$

❖ CZO 450°C

$$\begin{aligned}\Phi_s &= \frac{kT}{q} \ln \left(\frac{AA^*T^2}{q} \right) \\ &= \frac{8,617 \times 10^5 \times 300}{1,602 \times 10^{19}} \ln \left(\frac{0,0001 \times 32 \times 300^2}{15,994} \right) \\ &= 0,5596 \text{ eV}\end{aligned}$$

❖ CZO 500°C

$$\begin{aligned}\Phi_s &= \frac{kT}{q} \ln \left(\frac{AA^*T^2}{q} \right) \\ &= \frac{8,617 \times 10^5 \times 300}{1,602 \times 10^{19}} \ln \left(\frac{0,0001 \times 32 \times 300^2}{15,885} \right) \\ &= 0,5568 \text{ eV}\end{aligned}$$

❖ CZO 550°C

$$\begin{aligned}\Phi_s &= \frac{kT}{q} \ln \left(\frac{AA^*T^2}{q} \right) \\ &= \frac{8,617 \times 10^5 \times 300}{1,602 \times 10^{19}} \ln \left(\frac{0,0001 \times 32 \times 300^2}{15,8564} \right) \\ &= 0,5561 \text{ eV}\end{aligned}$$

❖ CZO 600°C

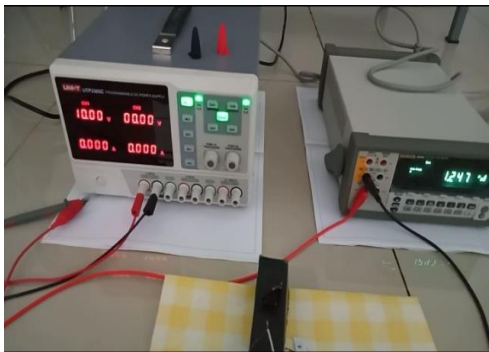
$$\begin{aligned}\Phi_s &= \frac{kT}{q} \ln \left(\frac{AA^*T^2}{q} \right) \\ &= \frac{8,617 \times 10^5 \times 300}{1,602 \times 10^{19}} \ln \left(\frac{0,0001 \times 32 \times 300^2}{15,843} \right)\end{aligned}$$

$$= 0,5557 \text{ eV}$$

❖ CZO tanpa *annealing*

$$\begin{aligned}\Phi_s &= \frac{kT}{q} \ln \left(\frac{AA^*T^2}{q} \right) \\ &= \frac{8,617 \times 10^5 \times 300}{1,602 \times 10^{19}} \ln \left(\frac{0,0001 \times 32 \times 300^2}{17,275} \right) \\ &= 0,5927 \text{ eV}\end{aligned}$$

Lampiran 5. Gambar Sampel, Larutan Prekursor dan Alat

	
Larutan Prekursor	Pengukuran I-V
	
Sampel Film Tipis pada Cawan	Sampel di dalam <i>Furnace</i>