

LAMPIRAN

Lampiran 1. Perhitungan Parameter Kisi Kristal Pb(Se_{0,6}Te_{0,4}) dengan menggunakan Metode Cohen

Persamaan hukum Bragg adalah $n\lambda = 2d \sin \theta$ (1)

Kristal Pb(Se_{0,6}Te_{0,4}) mempunyai struktur kubik dan untuk parameter kisi dapat dihitung dengan rumus jarak antar bidang sebagai berikut

$$\frac{1}{d^2} = \left(\frac{h^2 + k^2 + l^2}{a^2} \right) \quad (2)$$

Dengan menerapkan persamaan hukum Bragg (1) dan mensubstitusikan ke persamaan (2), maka didapatkan persamaan :

$$\frac{4 \sin^2 \theta}{\lambda^2} = \left(\frac{h^2 + k^2 + l^2}{a^2} \right) \quad (3)$$

Maka

$$\sin^2 \theta = \frac{\lambda^2}{4a^2} (h^2 + k^2 + l^2) \quad (4)$$

Untuk mendapatkan nilai parameter kisi a , dari persamaan (4) diperoleh :

$$\sin^2 \theta = \frac{\lambda^2}{4a^2} (h^2 + k^2 + l^2) \quad (5)$$

$$\frac{\lambda^2}{4a^2} = A, \quad \frac{\lambda^2}{4b^2} = B, \quad \frac{\lambda^2}{4c^2} = C \quad (6)$$

Dengan mensubstitusikan persamaan (6) ke dalam persamaan (5), didapatkan

$$\sin^2 \theta = A(h^2 + k^2 + l^2) \quad (7)$$

Alur Pemanasan 1

Material : Pb(Se_{0,6}Te_{0,4})

Radiasi : CuK α

$\lambda_{K\alpha 1} = 1,54060 \text{ \AA}$

Peak	2θ	$\sin^2 \theta$	$\frac{\sin^2 \theta}{3}$	$\frac{\sin^2 \theta}{4}$	$\frac{\sin^2 \theta}{8}$	$\frac{\sin^2 \theta}{11}$	$\frac{\sin^2 \theta}{12}$	hkl
1	25,0898	0,04713	0,01571	0,01178	0,00589	0,00428	0,00392	1 1 1
2	27,8734	0,05795	0,01931	0,01448	0,00724	0,00526	0,00482	2 0 0
3	28,9723	0,06251	0,02083	0,01562	0,00781	0,00568	0,00520	2 0 0
4	39,7648	0,11554	0,03851	0,02888	0,01444	0,01050	0,00962	2 2 0
5	41,4509	0,12511	0,04170	0,03127	0,01564	0,01137	0,01042	2 2 0
6	48,5600	0,16892	0,05630	0,04223	0,02111	0,01535	0,01407	2 2 2
7	49,0721	0,17228	0,05742	0,04307	0,02153	0,01566	0,01435	3 1 1
8	51,5000	0,18856	0,06285	0,04714	0,02357	0,01714	0,01571	2 2 2
9	57,2520	0,22931	0,07643	0,05732	0,02866	0,02084	0,01911	4 0 0
10	60,1875	0,25118	0,08372	0,06279	0,03139	0,02283	0,02093	4 0 0
11	64,6400	0,28558	0,09519	0,07139	0,03569	0,02596	0,02379	4 2 0
12	66,5400	0,30067	0,10022	0,07516	0,03758	0,02733	0,02505	3 3 1
13	68,0471	0,31279	0,10426	0,07820	0,03910	0,02843	0,02606	4 2 0

$$A = 0,0157$$

$$\frac{\lambda^2}{4a^2} = A$$

$$a = \frac{\lambda}{2\sqrt{A}} = \frac{1,54060}{2\sqrt{0,0157}} = \frac{1,54060}{0,1253}$$

$$a = 6,147663 \text{ \AA}$$

Pembuktian bahwa $a=b=c$

1. Perhitungan pertama untuk $2\theta = 28,9723$ $hkl = 2 0 0$

$$\sin^2 \theta = A h^2 + B k^2 + C l^2$$

$$\sin^2 \left(\frac{28,9723}{2} \right) = 4 A + 0 + 0$$

$$0,062573005 = 4 A$$

$$A = 0,015643251$$

$$a = \frac{\lambda}{2\sqrt{A}} = \frac{1,54060}{2 \times 0,125072984} = 6,158804041 \text{ \AA}$$

2. Perhitungan kedua untuk $2\theta = 41,4509$ $hkl = 2\ 2\ 0$

$$\sin^2 \theta = A h^2 + B k^2 + C l^2$$

$$\sin^2 \left(\frac{41,4509}{2} \right) = 4 A + 4 B + 0$$

$$0,125238358 = 0,062573005 + 4 B + 0$$

$$4 B = 0,062665353$$

$$B = 0,015666338$$

$$b = \frac{\lambda}{2\sqrt{B}} = \frac{1,54060}{2 \times 0,125165244} = 6,154264418 \text{ \AA}$$

3. Perhitungan ketiga untuk $2\theta = 51,5000$ $hkl = 2\ 2\ 2$

$$\sin^2 \theta = A h^2 + B k^2 + C l^2$$

$$\sin^2 \left(\frac{51,5000}{2} \right) = 4 A + 4 B + 4 C$$

$$0,188742681 = 0,062573005 + 0,062665353 + 4 C$$

$$4 C = 0,063504323$$

$$C = 0,01587608$$

$$c = \frac{\lambda}{2\sqrt{C}} = \frac{1,54060}{2 \times 0,126000321} = 6,113476483 \text{ \AA}$$

Tabel 1. Nilai parameter kisi kristal $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$ hasil preparasi pada pola alur pemanasan 1 terhadap JCPDS PbTe dan PbSe

Parameter kisi	Alur Pemanasan1	JCPDS PbSe	JCPDS PbTe
a	6,16 Å	6,1213 Å	6,454 Å
b	6,15 Å		
c	6,11 Å		
Struktur	Kubik	<i>Cubic</i>	<i>Cubic</i>

Dari perhitungan diatas, didapatkan bahwa nilai $a = 6,16 \text{ Å}$, $b = 6,15 \text{ Å}$, dan $c = 6,11 \text{ Å}$. Perhitungan dari ketiga nilai a , b , dan c hasil yang didapatkan nilainya hampir sama dan jika a , b , dan c dirata-rata maka diperoleh $6,14 \text{ Å}$. Dari perhitungan tersebut jika dibandingkan dengan data JCPDS PbSe dan JCPDS PbTe maka dapat dikatakan bahwa nilai $a = b = c$ sehingga struktur kristal $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$ termasuk jenis struktur kristal kubik.

Alur Pemanasan 2

Material : Pb(Se_{0,6}Te_{0,4})

Radiasi : CuK α

$\lambda_{\text{K}\alpha 1} = 1,54060 \text{ \AA}$

Peak	2θ	$\sin^2\theta$	$\frac{\sin^2\theta}{3}$	$\frac{\sin^2\theta}{4}$	$\frac{\sin^2\theta}{8}$	$\frac{\sin^2\theta}{11}$	$\frac{\sin^2\theta}{12}$	hkl
1	25,0526	0,04699	0,01566	0,01174	0,00587	0,00427	0,00391	1 1 1
2	27,82	0,05773	0,01924	0,01443	0,00721	0,00524	0,00481	2 0 0
3	28,9969	0,06261	0,02087	0,01565	0,00782	0,00569	0,00521	2 0 0
4	39,64	0,11485	0,03828	0,02871	0,01435	0,01044	0,00957	2 2 0
5	41,4404	0,12505	0,04168	0,03126	0,01563	0,01136	0,01042	2 2 0
6	49,0425	0,17208	0,05736	0,04302	0,02151	0,01564	0,01434	3 1 1
7	51,3623	0,18762	0,06254	0,04690	0,02345	0,01705	0,01563	2 2 2
8	60,1108	0,25060	0,08353	0,06265	0,03132	0,02278	0,02088	4 0 0
9	68,049	0,31281	0,07643	0,07820	0,03910	0,02843	0,02606	4 2 0

$$A = 0,0156$$

$$\frac{\lambda^2}{4a^2} = A$$

$$a = \frac{\lambda}{2\sqrt{A}} = \frac{1,54060}{2\sqrt{0,0156}} = \frac{1,54060}{0,1249}$$

$$a = 6,167336 \text{ \AA}$$

Pembuktian bahwa $a=b=c$

1. Perhitungan pertama untuk $2\theta = 28,9969$ $hkl = 2 0 0$

$$\sin^2\theta = A h^2 + B k^2 + C l^2$$

$$\sin^2\left(\frac{28,9969}{2}\right) = 4 A + 0 + 0$$

$$0,062677031 = 4 A$$

$$A = 0,015669257$$

$$a = \frac{\lambda}{2\sqrt{A}} = \frac{1,54060}{2 \times 0,125176905} = 6,15369101 \text{ \AA}$$

2. Perhitungan kedua untuk $2\theta = 41,4404 \text{ hkl} = 2 \ 2 \ 0$

$$\sin^2 \theta = A h^2 + B k^2 + C l^2$$

$$\sin^2 \left(\frac{41,4404}{2} \right) = 4 A + 4 B + 0$$

$$0,125177708 = 0,062677031 + 4 B + 0$$

$$4 B = 0,062500677$$

$$B = 0,015625169$$

$$b = \frac{\lambda}{2\sqrt{B}} = \frac{1,54060}{2 \times 0,12500676} = 6,162366625 \text{ \AA}$$

3. Perhitungan ketiga untuk $2\theta = 51,3623 \text{ hkl} = 2 \ 2 \ 2$

$$\sin^2 \theta = A h^2 + B k^2 + C l^2$$

$$\sin^2 \left(\frac{51,3623}{2} \right) = 4 A + 4 B + 4 C$$

$$0,187803153 = 0,062677031 + 0,062500677 + 4 C$$

$$4 C = 0,062625445$$

$$C = 0,015656361$$

$$c = \frac{\lambda}{2\sqrt{C}} = \frac{1,54060}{2 \times 0,125125302} = 6,156224946 \text{ \AA}$$

Tabel 2. Nilai parameter kisi kristal $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$ hasil preparasi pada pola alur pemanasan 2 terhadap JCPDS PbTe dan PbSe

Parameter kisi	Alur Pemanasan1	JCPDS PbSe	JCPDS PbTe
a	6,15 Å	6,1213 Å	6,454 Å
b	6,16 Å		
c	6,15 Å		
Struktur	Kubik	<i>Cubic</i>	<i>Cubic</i>

Dari perhitungan diatas, didapatkan bahwa nilai $a = 6,15$ Å, $b = 6,16$ Å, dan $c = 6,15$ Å. Perhitungan dari ketiga nilai a , b , dan c hasil yang didapatkan nilainya hampir sama dan jika a , b , dan c dirata-rata maka diperoleh 6,16 Å. Dari perhitungan tersebut jika dibandingkan dengan data JCPDS PbSe dan JCPDS PbTe maka dapat dikatakan bahwa nilai $a = b = c$ sehingga struktur kristal $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$ termasuk jenis struktur kristal kubik.

Tabel 3. Perbandingan parameter kisi kristal $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$ hasil preparasi pada pola alur pemanasan 1 dan pola alur pemanasan 2 terhadap JCPDS PbTe dan PbSe

Parameter kisi	Alur Pemanasan		JCPDS PbSe	JCPDS PbTe
	Alur pemanasan 1	Alur pemanasan 2		
a	6,14 Å	6,16 Å	6,1213 Å	6,454 Å
Struktur	Kubik	Kubik	<i>Cubic</i>	<i>Cubic</i>

Berdasarkan nilai h , k , dan l pada data JCPDS PbSe dan JCPDS PbTe, secara umum struktur kristal $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$ termasuk jenis struktur kristal kubik. Namun, berdasarkan nilai h , k , dan l untuk struktur kubik pada data JCPDS PbSe dan JCPDS PbTe kristal $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$ termasuk jenis struktur kristal kubik pusat muka (*face center cubic*) dan nilai h , k , dan l adalah bilangan cacah, maka didapatkan

$$A = \left(\frac{\sin^2 \theta}{3}, \frac{\sin^2 \theta}{4}, \frac{\sin^2 \theta}{8}, \frac{\sin^2 \theta}{11}, \frac{\sin^2 \theta}{12}, \dots \right)$$

Lampiran 2. Hasil Karakterisasi Bahan Pb(Se_{0,6}Te_{0,4}) dengan XRD

a. Hasil XRD Bahan Pb(Se_{0,6}Te_{0,4}) pada alur pemanasan 1

*** Basic Data Process ***

Group Name : Data 2012

Data Name : Dwi Nova UNY

File Name : Dwi Nova UNY.PKR

Sample Name : Pb(Se_{0,6} Te_{0,4}) I=500'

Comment : Pb(Se_{0,6} Te_{0,4}) I=500'C

Strongest 3 peaks

no.	peak	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	19	28.9723	3.07940	100	0.45990	526	13867
2	18	27.8734	3.19826	97	0.41580	509	12640
3	29	41.4509	2.17666	62	0.50850	326	8522

Peak Data List

no.	peak	2Theta (deg)	d (A)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
1	8.2800	10.66990	4	0.30660	20	579	
2	9.0200	9.79613	6	0.64000	30	1195	
3	9.6000	9.20554	5	0.00000	28	0	
4	9.9000	8.92725	6	0.00000	30	0	
5	10.2000	8.66535	6	0.51000	32	1005	
6	10.7200	8.24615	4	0.00000	20	0	
7	10.8600	8.14016	4	0.00000	21	0	
8	11.1400	7.93618	5	0.00000	28	0	
9	11.7600	7.51913	6	0.40000	29	1074	
10	12.3400	7.16699	4	0.20000	19	367	
11	18.5750	4.77295	3	0.23000	16	522	
12	22.6560	3.92159	9	0.27200	49	870	
13	24.1515	3.68204	7	0.51300	37	1278	
14	25.0898	3.54643	55	0.36620	288	6611	
15	25.7800	3.45302	13	0.00000	69	0	
16	26.1600	3.40372	25	0.37660	132	2990	
17	26.8630	3.31622	3	0.42600	16	510	
18	27.8734	3.19826	97	0.41580	509	12640	
19	28.9723	3.07940	100	0.45990	526	13867	
20	31.4275	2.84420	3	0.31500	16	423	
21	35.6400	2.51709	13	0.33720	70	1562	
22	35.9600	2.49542	7	0.00000	39	0	
23	36.3600	2.46888	7	0.40000	38	970	
24	36.8400	2.43781	8	0.36000	43	818	
25	37.3205	2.40752	17	0.38110	87	1753	
26	39.7648	2.26498	45	0.64370	236	7447	
27	40.3000	2.23613	20	0.00000	105	0	
28	40.9800	2.20058	24	0.00000	125	0	
29	41.4509	2.17666	62	0.50850	326	8522	
30	42.1933	2.14007	4	0.29330	20	410	
31	43.7000	2.06971	3	0.18000	16	227	
32	44.0310	2.05491	6	0.40200	30	780	
33	45.9233	1.97455	3	0.19330	16	443	
34	48.5600	1.87332	3	0.18000	18	243	
35	49.0721	1.85496	25	0.49080	131	3130	
36	49.7800	1.83022	7	0.45340	36	991	
37	50.2600	1.81386	4	0.21000	21	360	
38	51.1600	1.78405	13	0.44000	68	1654	
39	51.5000	1.77307	19	0.25780	98	1273	
40	57.2520	1.60784	7	0.37600	39	764	
41	57.7600	1.59490	7	0.33340	37	644	
42	58.2850	1.58178	5	0.49000	27	657	
43	58.8125	1.56884	4	0.26500	23	308	
44	59.2650	1.55794	5	0.29000	26	360	

peak no.	2Theta (deg)	d (Å)	I/I1	FWHM (deg)	Intensity (Counts)	Integrated Int (Counts)
45	59.6400	1.54904	5	0.28000	26	422
✓46	60.1875	1.53625	9	0.41500	48	980
47	60.7720	1.52286	6	0.30400	33	534
✓48	64.6400	1.44076	16	0.28300	85	1836
49	64.9400	1.43483	12	0.00000	65	0
50	65.3800	1.42623	10	0.36000	54	1511
51	65.8033	1.41808	12	0.27330	61	1062
52	66.1400	1.41168	6	0.00000	33	0
53	66.5400	1.40416	5	0.00000	26	0
54	66.9200	1.39710	7	0.35200	36	779
55	67.6600	1.38361	10	0.76000	51	1469
✓56	68.0471	1.37668	18	0.48080	95	1665
57	68.5000	1.36868	3	0.20000	18	259
58	71.6000	1.31685	7	0.21000	35	511
59	72.0000	1.31051	9	0.36000	47	829
60	72.3400	1.30519	5	0.29600	26	357
61	72.7100	1.29946	4	0.34000	19	409
62	74.7366	1.26916	6	0.24670	29	500
63	75.1850	1.26270	7	0.29000	35	549
64	75.6775	1.25570	9	0.31500	49	753
65	76.0517	1.25045	3	0.25000	18	269
66	79.4783	1.20492	3	0.21670	17	315
67	80.7980	1.18854	4	0.19600	21	306
68	81.2233	1.18339	4	0.22000	19	313
69	84.3650	1.14714	3	0.23000	16	289
70	85.2500	1.13748	4	0.26000	20	347
71	85.7625	1.13199	4	0.28500	23	453
72	89.2350	1.09671	3	0.27000	17	427

*** Basic Data Process ***

```
# Data Information
  Group Name      : Data 2012
  Data Name       : Dwi Nova UNY
  File Name       : Dwi Nova UNY.RAW
  Sample Name     : Pb(Se0,6 Te0,4) I=500'
  Comment         : Pb(Se0,6 Te0,4) I=500'C
  Date & Time     : 01-01-02 02:19:50

# Measurement Condition
  X-ray tube
    target        : Cu
    voltage       : 40.0 (kV)
    current       : 30.0 (mA)

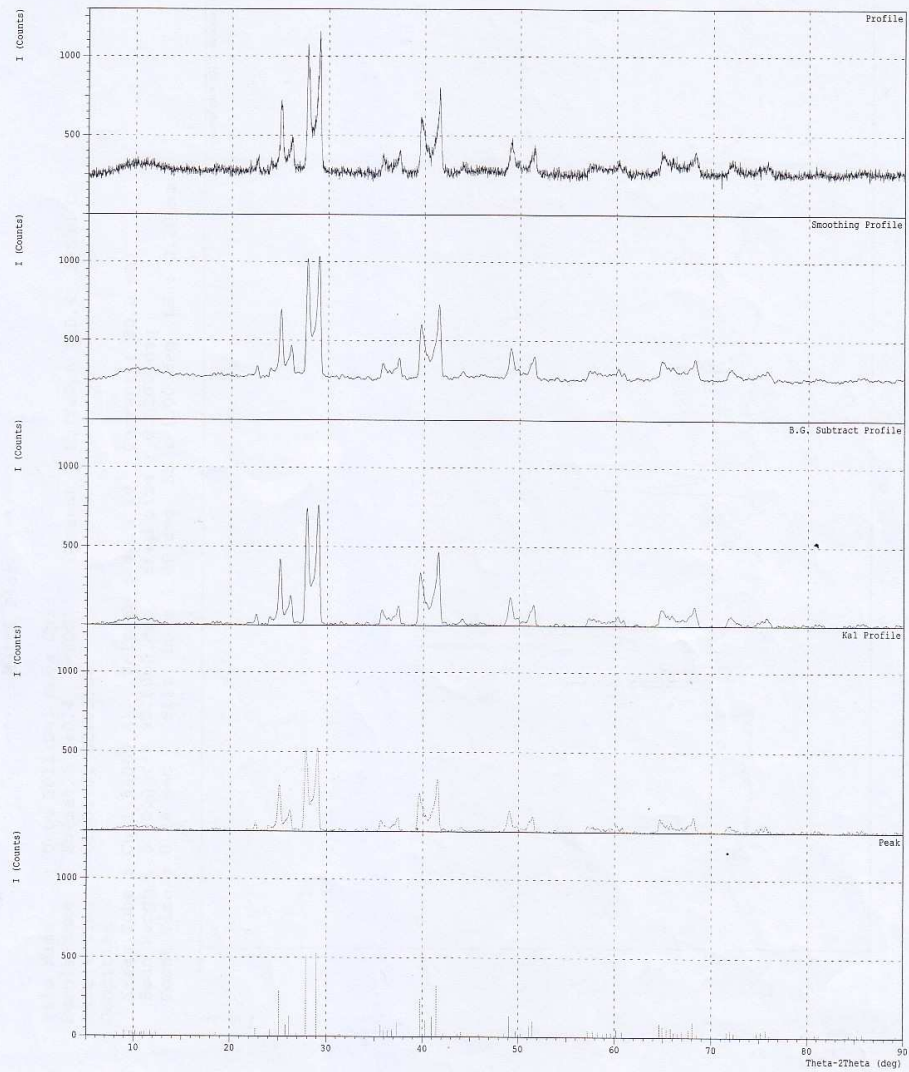
  Slits
    divergence slit : 1.00 (deg)
    scatter slit    : 1.00 (deg)
    receiving slit   : 0.30 (mm)

  Scanning
    drive axis      : Theta-2Theta
    scan range      : 5.0000 - 90.0000 (deg)
    scan mode       : Continuous Scan
    scan speed      : 5.0000 (deg/min)
    sampling pitch   : 0.0200 (deg)
    preset time     : 0.24 (sec)

# Data Process Condition
  Smoothing        [ AUTO ]
    smoothing points : 23
  B.G.Subtraction  [ AUTO ]
    sampling points  : 33
    repeat times     : 30
  Kal-a2 Separate  [ MANUAL ]
    Kal a2 ratio     : 50 (%)
  Peak Search      [ AUTO ]
    differential points : 21
    FWHM threshold    : 0.050 (deg)
    intensity threshold : 30 (par mil)
    FWHM ratio (n-1)/n : 2
  System error Correction [ NO ]
  Precise peak Correction [ NO ]
```

*** Basic Data Process ***

Group Name : Data 2012
Data Name : Dwi Nova UNY
File Name : Dwi Nova UNY.PKR
Sample Name : Pb(Se_{0,6} Te_{0,4}) I=500'
Comment : Pb(Se_{0,6} Te_{0,4}) I=500'C



b. Hasil XRD Bahan $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$ pada alur pemanasan 2

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*** Basic Data Process ***

Group Name : Data 2012
Data Name : Dwi Nova UNY-2
File Name : Dwi Nova UNY-2.PKR
Sample Name : Pb(Se0,6TeO,4) 600'C
Comment : Pb(Se0,6TeO,4) bahan2 600'C

# Strongest 3 peaks
no. peak 2Theta d I/I1 FWHM Intensity Integrated Int
      no. (deg) (A)      (deg) (Counts) (Counts)
1      7 28.9969 3.07685 100 0.30060 1471 30688
2     13 41.4404 2.17719 44 0.37550 647 16396
3      5 27.8200 3.20428 32 0.35840 476 11465

# Peak Data List
peak 2Theta d I/I1 FWHM Intensity Integrated Int
no. (deg) (A)      (deg) (Counts) (Counts)
1 22.5715 3.93608 5 0.36700 70 1847
2 25.0526 3.55161 30 0.28850 446 8990
3 25.5400 3.48492 5 0.00000 76 0
4 26.1368 3.40669 24 0.28630 353 6813
5 27.8200 3.20428 32 0.35840 476 11465
6 28.2200 3.15976 18 0.00000 269 0
7 28.9969 3.07685 100 0.30060 1471 30688
8 37.2504 2.41189 10 0.43090 148 4009
9 39.6400 2.27183 10 0.34580 151 3645
10 39.9600 2.25437 8 0.00000 117 0
11 40.5200 2.22450 7 0.00000 99 0
12 40.6800 2.21611 8 0.00000 120 0
13 41.4404 2.17719 44 0.37550 647 16396
14 44.0185 2.05547 3 0.31710 50 1048
15 49.0425 1.85601 10 0.41840 147 3690
16 50.9800 1.78992 4 0.52000 55 1770
17 51.3623 1.77750 9 0.47050 139 3156
18 59.8000 1.54527 4 0.22400 56 771
19 60.1108 1.53802 9 0.26170 127 2348
20 65.0450 1.43277 3 0.17000 46 846
21 67.3800 1.38868 5 0.36000 67 1847
22 67.7600 1.38181 6 0.40000 83 1294
23 68.0490 1.37665 12 0.31310 182 2920
24 75.6125 1.25662 6 0.50500 94 3509

```


*** Basic Data Process ***

```
# Data Infomation
  Group Name      : Data 2012
  Data Name       : Dwi Nova UNY-2
  File Name       : Dwi Nova UNY-2.RAW
  Sample Name     : Pb(SeO,6TeO,4) 600'C
  Comment         : Pb(SeO,6TeO,4) bahan2 600'C
  Date & Time     : 01-01-02 00:21:59

# Measurement Condition
  X-ray tube
    target        : Cu
    voltage       : 40.0 (kV)
    current       : 30.0 (mA)

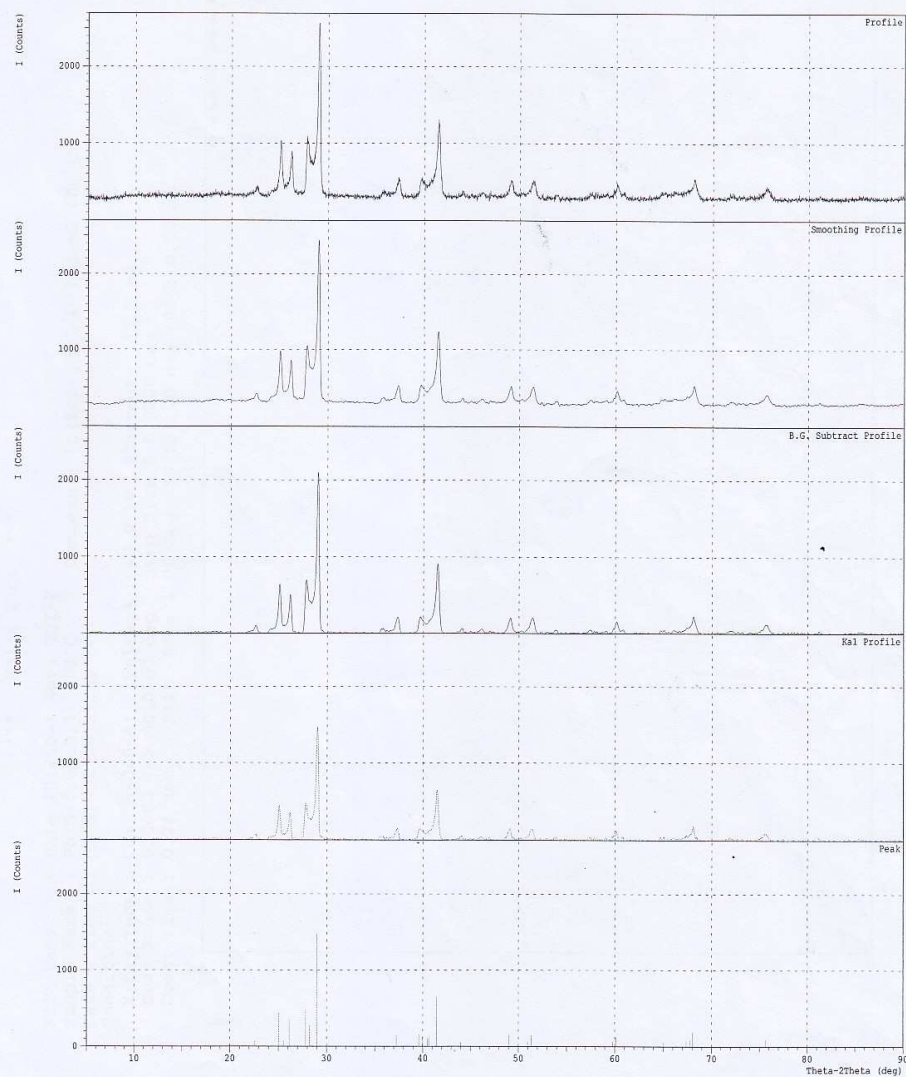
  Slits
    divergence slit : 1.00 (deg)
    scatter slit    : 1.00 (deg)
    receiving slit   : 0.30 (mm)

  Scanning
    drive axis      : Theta-2Theta
    scan range      : 5.0000 - 90.0000 (deg)
    scan mode       : Continuous Scan
    scan speed      : 5.0000 (deg/min)
    sampling pitch   : 0.0200 (deg)
    preset time     : 0.24 (sec)

# Data Process Condition
  Smoothing [ AUTO ]
    smoothing points : 17
  B.G.Subtraction [ AUTO ]
    sampling points  : 17
    repeat times     : 30
  Kal-a2 Separate [ MANUAL ]
    Kal a2 ratio     : 50 (%)
  Peak Search [ AUTO ]
    differential points : 15
    FWHM threshold     : 0.050 (deg)
    intensity threshold : 30 (par mil)
    FWHM ratio (n-1)/n : 2
  System error Correction [ NO ]
  Precise peak Correction [ NO ]
```

*** Basic Data Process ***

Group Name : Data 2012
Data Name : Dwi Nova UNY-2
File Name : Dwi Nova UNY-2.PKR
Sample Name : Pb(SeO₃,6TeO₃,4) 600'C
Comment : Pb(SeO₃,6TeO₃,4) bahan2 600'C



Lampiran 3. Tabel JCPDS PbSe dan PbTe

Tabel JCPDS PbSe

78-1903	Wavelength= 1.54060					C
PbSe	2 θ	Int	h	k	l	
Lead Selenide	25.179 368	1	1	1		
	29.154 999*	2	0	0		
	41.701 663	2	2	0		
	49.336 145	3	1	1		
Rad.: CuK α 1 λ : 1.54060 Filter:	51.688 208	2	2	2		
d-sp: Calculated	60.445 86	4	0	0		
Cut off: 17.7 Int.: Calculated	66.531 49	3	3	1		
I/Icon.: 17.05	68.495 211	4	2	0		
Ref: Calculated from ICSD using POWD-12++, (1997)	76.119 141	4	2	2		
Ref: Noda, Y et al., Acta Crystallogr., Sec. C., 43, 1443 (1987)	81.670 30	5	1	1		
Sys.: Cubic	S.G.: Fm $\bar{3}$ m (225)					
a: 6.1213(8) b:	c:	A:	C:			
α :	β :	γ :	Z: 4	mp:		
Ref: Ibid.						
Dx: 8.287	Dm:	ICSD #: 063097				
Peak height intensity, R-factor: 0.029, CI Na type, PSC:						
cF8. Structural reference: Noda, Y et al., Acta						
Crystallogr., Sec. C., 43, 1443 (1987). Mwt: 286.16.						
Volume[CD]: 229.37.						



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PCPDFWIN v. 2.2

Tabel JCPDS PbTe

78-1905					Wavelength = 1.54056				
PbTe					2 θ	Int	h	k	l
Lead Telluride					23.861	87	1	1	1
					27.620	999*	2	0	0
					39.459	676	2	2	0
Altaite					46.638	34	3	1	1
					d-sp: Calculated				
Rad : CuK α	λ : 1.54060	Filter:			48.843	215	2	2	2
	Int :	I/Icor							
Cut Off:	17.7	Calculated		19.71	57.033	91	4	0	0
Ref :	Noda, et al., Acta Crystallogr., Sec. C., 43, 1443 (1987)				62.697	11	3	3	1
					64.520	227	4	2	0
					71.564	150	4	2	2
Sys : Cubic					76.658	6	5	1	1
a: 6.454(1)	b:	c:	A:	C:	84.933	39	4	4	0
α :	β :	γ :	Z: 4	mp:	89.837	4	5	3	1
Ref: Ibid									
Dx: 8.272					Dm : ICSD # : 063099				
Peak height intensity R-Factor: 0.048. CI									
NaType, PSC: cF8. Structural Reference									
Noda, et al., Acta Crystallogr., Sec. C., 43, 1443 (1987). Mwt:									
334.80.									
Volume[CD]: 268.84									
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PCPDFWIN V 2.2									

Lampiran 4. Tabel Nilai Indeks Miller (hkl) untuk Struktur Kristal Kubik

QUADRATIC FORMS OF MILLER INDICES

$h^2 + k^2 + l^2$	Cubic				Hexagonal	
	hkl				$h^2 + hk + k^2$	hk
	Simple	Face-centered	Body-centered	Diamond		
1	100				1	10
2	110		110		2	
3	111			111	3	11
4	200	200	200		4	20
5	210				5	
6	211		211		6	
7					7	21
8	220	220	220	220	8	
9	300, 221				9	30
10	310		310		10	
11	311	311		311	11	
12	222	222	222		12	22
13	320				13	31
14	321		321		14	
15					15	
16	400	400	400	400	16	40
17	410, 322				17	
18	411, 330		411, 330		18	
19	331	331		331	19	32
20	420	420	420		20	
21	421				21	41
22	332		332		22	
23					23	
24	422	422	422	422	24	
25	500, 430				25	50
26	510, 431		510, 431		26	
27	511, 333	511, 333		511, 333	27	33
28					28	42
29	520, 432				29	
30	521		521		30	
31					31	51
32	440	440	440	440	32	
33	522, 441				33	
34	530, 433		530, 433		34	
35	531	531		531	35	
36	600, 442	600, 442	600, 442		36	60
37	610				37	43
38	611, 532		611, 532		38	
39					39	52
40	620	620	620	620	40	
41	621, 540, 443				41	
42	541		541		42	
43	533			533	43	61
44	622	622	622		44	
45	630, 542				45	
46	631		631		46	
47					47	
48	444	444	444	444	48	44
49	700, 632				49	70, 53

(cont.)

$h^2 + k^2 + l^2$	hkl				$h^2 + hk + k^2$	hk
	Simple	Face-centered	Body-centered	Diamond		
50	710, 550, 543		710, 550, 543		50	
51	711, 551	711, 551		711, 551	51	
52	640	640	640		52	62
53	720, 641				53	
54	721, 633, 552		721, 633, 552		54	
55					55	
56	642	642	642	642	56	
57	722, 544				57	71
58	730		730		58	
59	731, 553	731, 553		731, 553	59	

Lampiran 5. Dokumentasi Penelitian



Furnace



sistem vakum



Kapsul Kristal $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$



ingot $\text{Pb}(\text{Se}_{0,6}\text{Te}_{0,4})$



Alat penggerus



penjepit



Mesin SEM



komputer XRD



Mesin XRD