





Department of Metallurgy and Materials Engineering
UNIVERSITY OF INDONESIA

CHEMICAL COMPOSITION TEST REPORT

Contract No. / No. Kontrak : Cai 4

Standards / Standar : ASTM A751

Customer / Pemberi Kerja :

Materials / Material : }

| | Al | Si | Fe | Cu | Mn | Mg | Zn | Cr |
|-----|------|--------|----------|----------|--------|-------|-------|----------|
| 1 | 87.6 | 0.0175 | < 0.0010 | < 0.0010 | 0.0762 | >12.0 | 0.144 | < 0.0010 |
| 2 | 87.6 | 0.0115 | < 0.0010 | < 0.0010 | 0.0729 | >12.0 | 0.149 | < 0.0010 |
| 3 | 87.6 | 0.0092 | < 0.0010 | < 0.0010 | 0.0710 | >12.0 | 0.123 | < 0.0010 |
| Ave | 87.6 | 0.0127 | < 0.0010 | < 0.0010 | 0.0734 | >12.0 | 0.139 | < 0.0010 |

| | Ni | Ti | Be | Ca | Li | Pb | Sn | Sr |
|-----|----------|--------|--------|----------|----------|--------|----------|--------|
| 1 | < 0.0050 | 0.0146 | 0.0003 | < 0.0005 | < 0.0001 | 0.0098 | < 0.0100 | 0.0016 |
| 2 | < 0.0050 | 0.0154 | 0.0003 | < 0.0005 | < 0.0001 | 0.0077 | < 0.0100 | 0.0014 |
| 3 | < 0.0050 | 0.0142 | 0.0003 | < 0.0005 | < 0.0001 | 0.0080 | < 0.0100 | 0.0014 |
| Ave | < 0.0050 | 0.0147 | 0.0003 | < 0.0005 | < 0.0001 | 0.0085 | < 0.0100 | 0.0015 |

| | V | Na | Bi | Zr | B | Ga | Cd | Co |
|-----|--------|----------|--------|--------|--------|--------|--------|----------|
| 1 | 0.0292 | < 0.0005 | 0.0233 | 0.0183 | 0.0019 | 0.0081 | 0.0079 | < 0.0030 |
| 2 | 0.0289 | < 0.0005 | 0.0185 | 0.0169 | 0.0015 | 0.0081 | 0.0076 | < 0.0030 |
| 3 | 0.0288 | < 0.0005 | 0.0212 | 0.0163 | 0.0013 | 0.0076 | 0.0059 | < 0.0030 |
| Ave | 0.0290 | < 0.0005 | 0.0210 | 0.0172 | 0.0016 | 0.0079 | 0.0071 | < 0.0030 |

| | Ag | Hg | In |
|-----|----------|----------|----------|
| 1 | 0.0010 | < 0.0030 | < 0.0100 |
| 2 | < 0.0010 | < 0.0030 | < 0.0100 |
| 3 | < 0.0010 | < 0.0030 | < 0.0100 |
| Ave | < 0.0010 | < 0.0030 | < 0.0100 |

Datum / date
5/29/2008

Tested by / Diuji oleh :

Edy

Approved by / Disetujui oleh :

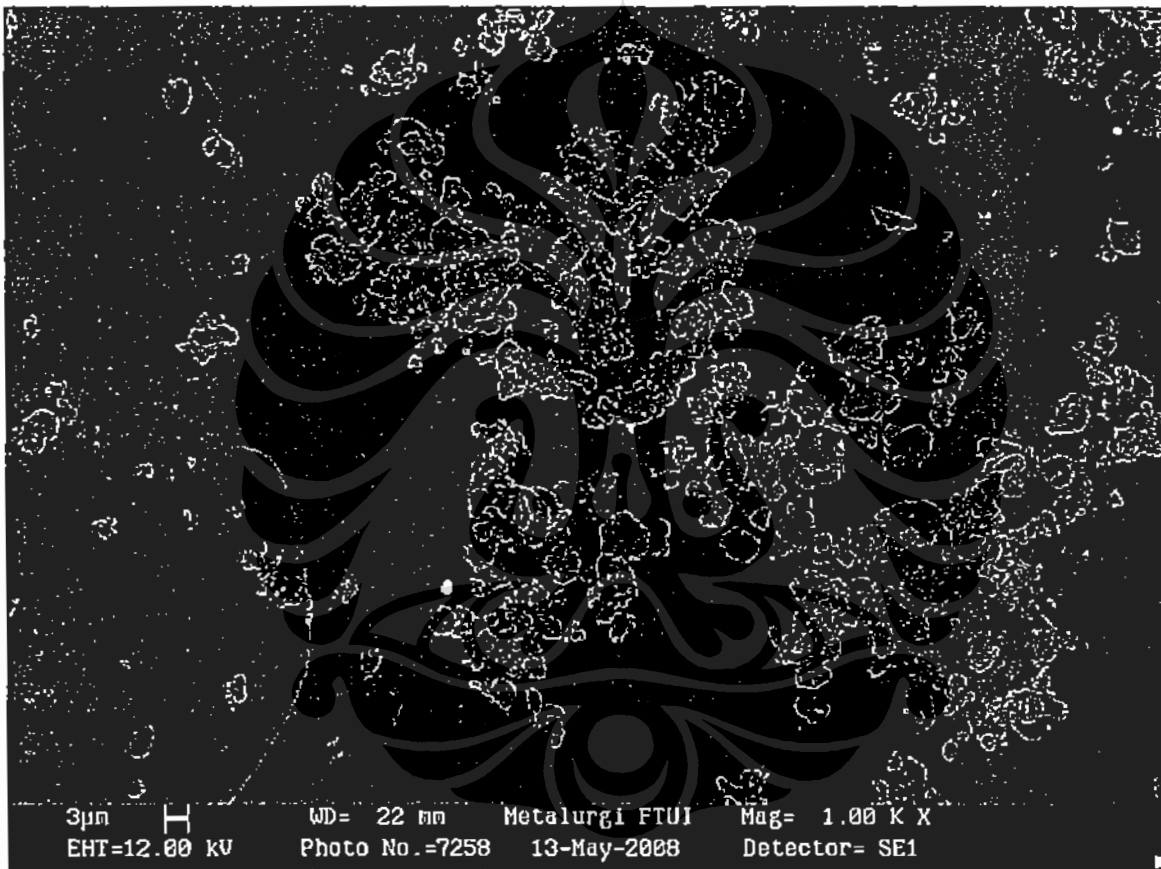
Center of Materials Processing and Failure Analysis
Dept. of Metallurgy and Material Engineering
Berdung Metalurgi dan Material FTUI
Campus Baru Universitas Indonesia
Depok - West Java INDONESIA 16424
Tel. : +62 21 7863510 Fax: +62 21 7872350
Web: www.metal.ui.ac.id

E-mail: cmpfa@metal.ui.ac.id Karakteristik..., Edy Yulianto, FTUI, 2008

LAMPIRAN 2

HASIL PENGUKURAN DISTRIBUSI UKURAN SERBUK ALUMINA





Gambar 2.1. Distribuai Ukuran Serbuk Alumina dengan Ukuran Rata-Rata 5,77 µm

Laporan Pengujian

No.Lap. : R108230

No. Order : J1080208

Tanggal : 23-05-2008

Customer : Departemen Metalurgi dan Material Universitas Indonesia
Depok

Kontak Person : Bpk. Edy Yulianto, S.Tmet

Jenis Sampel : Serbuk Aluminium oksida

Penerimaan sampel : 15 Mei 2008

Tanggal Pengujian : 21-23 Mei 2008

Tipe Pengujian : Pengukuran Distribusi Partikel secara Sedimentometri

KONDISI PENGUJIAN

Sampel serbuk sebanyak 0,05 gram didispersikan dalam air destilasi, dimasukkan 0,2 gram dispersan, kemudian diaduk dalam *cuvette holder*. *Cuvette Holder* dimasukkan ke dalam *sedimentometer* dan dianalisa pada suhu 20 °C. Sebagai standard digunakan material *quartz*. Pengujian dilakukan sebanyak 3 kali dan dihitung nilai rata-ratanya.

HASIL PENGUJIAN

| Ukuran Partikel (μm) | Fraksi sample serbuk (%), pada pengukuran: | | | Rerata | Komulatif |
|--------------------------------------|--|-------|-------|--------|-----------|
| | I | II | II | | |
| < 1,000 | 1,14 | 1,02 | 3,90 | 2,02 | 2,02 |
| 1,000 - 1,500 | 0,45 | 0,56 | 1,04 | 0,68 | 2,70 |
| 1,500 - 2,000 | 0,95 | 1,17 | 1,43 | 1,18 | 3,89 |
| 2,000 - 2,500 | 1,62 | 1,78 | 1,91 | 1,77 | 5,66 |
| 2,500 - 3,000 | 2,33 | 2,48 | 2,49 | 2,43 | 8,09 |
| 3,000 - 4,000 | 6,12 | 6,29 | 5,88 | 6,10 | 14,19 |
| 4,000 - 5,000 | 6,10 | 5,95 | 5,66 | 5,90 | 20,09 |
| 5,000 - 6,000 | 4,55 | 4,71 | 4,62 | 4,63 | 24,72 |
| 6,000 - 8,000 | 5,55 | 5,84 | 5,99 | 5,79 | 30,51 |
| 8,000 - 10,000 | 2,92 | 3,23 | 3,18 | 3,11 | 33,62 |
| 10,000 - 12,500 | 2,22 | 3,17 | 2,52 | 2,64 | 36,26 |
| 12,500 - 16,000 | 4,25 | 3,70 | 4,18 | 4,04 | 40,30 |
| 16,000 - 20,000 | 3,57 | 4,20 | 4,45 | 4,07 | 44,37 |
| 20,000 - 25,000 | 6,12 | 6,84 | 5,71 | 6,22 | 50,60 |
| 25,000 - 31,500 | 11,81 | 11,30 | 9,76 | 10,96 | 61,55 |
| 31,500 - 40,000 | 20,04 | 19,88 | 17,44 | 19,12 | 80,67 |
| 40,000 - 50,000 | 19,44 | 17,20 | 19,01 | 18,55 | 99,22 |
| > 50,000 | 0,82 | 0,68 | 0,83 | 0,78 | 100,00 |

Manajer Teknik Pengujian Kimia

Ukuran Rata-Rata 23,35 μm



Drs. Saeful Rohman

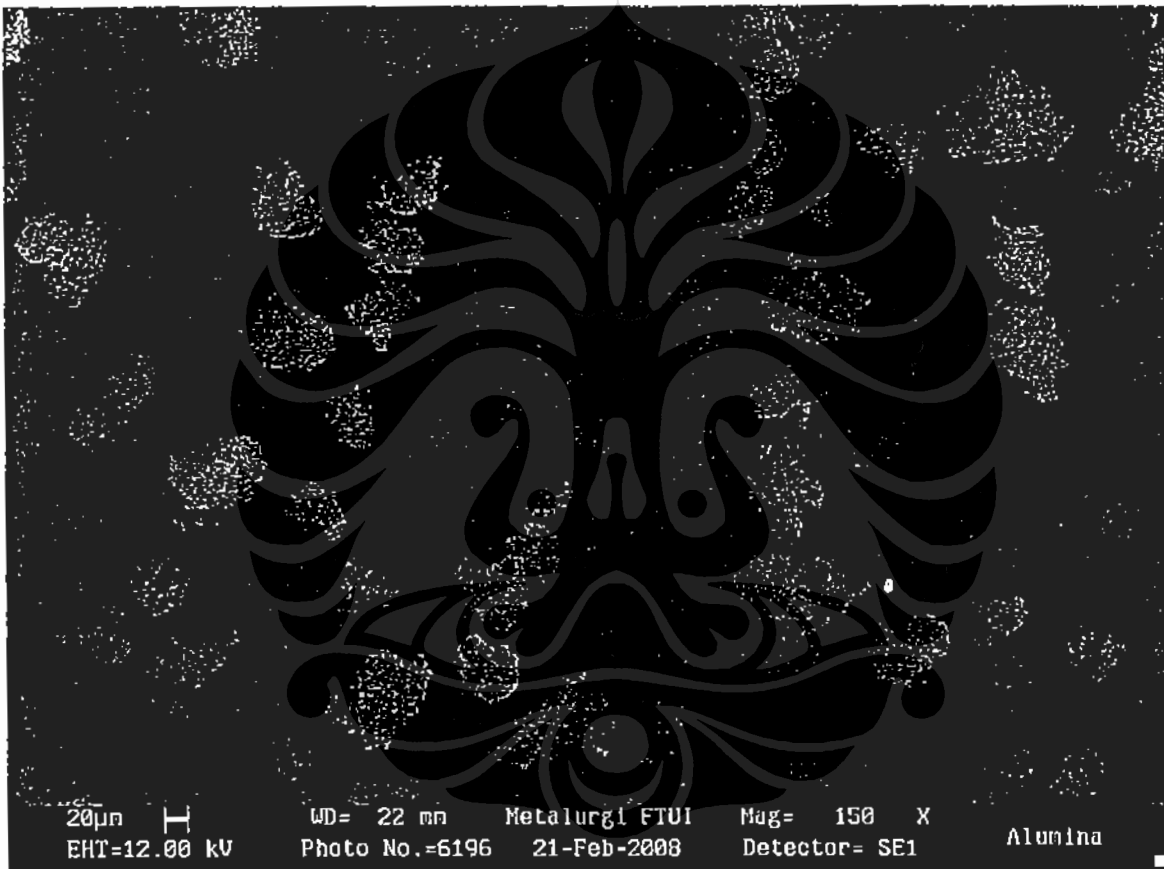
ORIGINAL

Laporan hasil pengujian ini hanya berlaku untuk sampel yang diuji di STP, segala pengaduan sehubungan dengan pelayanan dapat disampaikan ke Manajer Mutu STP, dilarang menggandakan laporan ini tanpa persetujuan tertulis dari STP. Kawasan PUSPIPEK - Gedung 460, Serpong, Tangerang 15314 - Indonesia

Tel : 62-21-758-729-33 / 756-0562-3418, Fax : 62-21-750-0057-0068, e-mail : stpoffice@sentrapolimer.com

alumina - 3

Edy 02/08

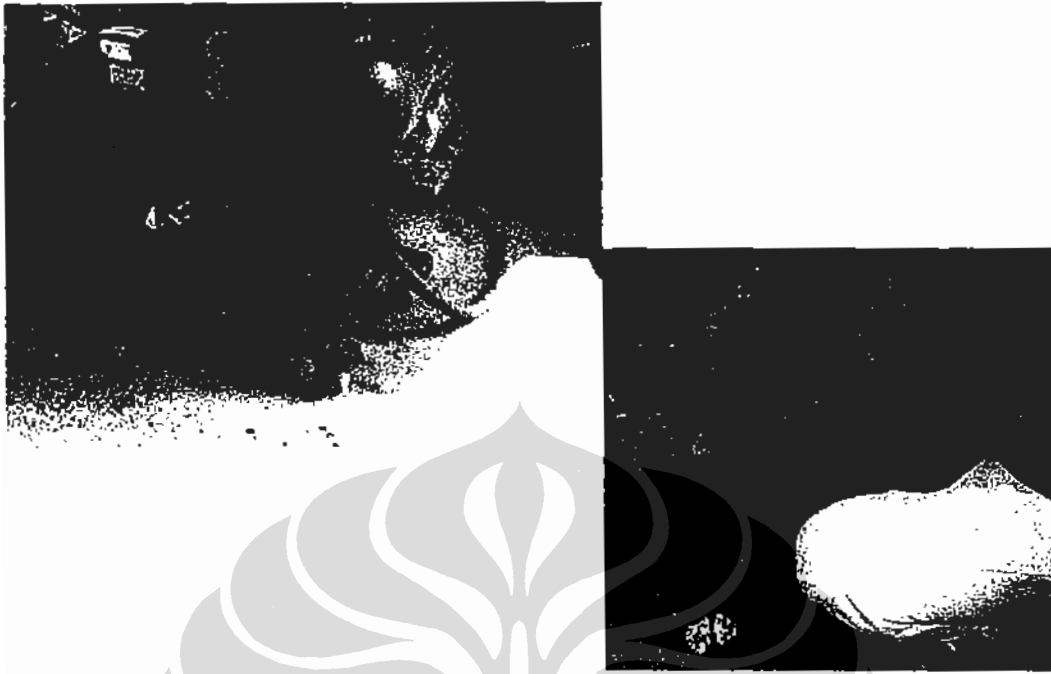


Gambar 2.3. Distribuai Ukuran Serbuk Alumina dengan Ukuran Rata-Rata 45 μm



LAMPIRAN 3

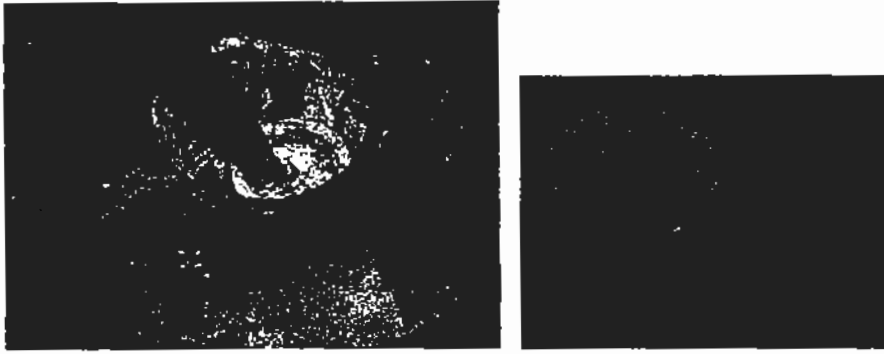
**FOTO KEGIATAN DAN PERALATAN PEMBUATAN
BUSA ALUMINIUM DENGAN INJEKSI GAS**



Gambar 1. Persiapan Pembuatan Busa Aluminium



Gambar 2. Proses Peleburan pada Pembuatan Busa Aluminium



Gambar 3. Proses Pengadukan dan Pembusaan pada Pembuatan Busa Aluminium



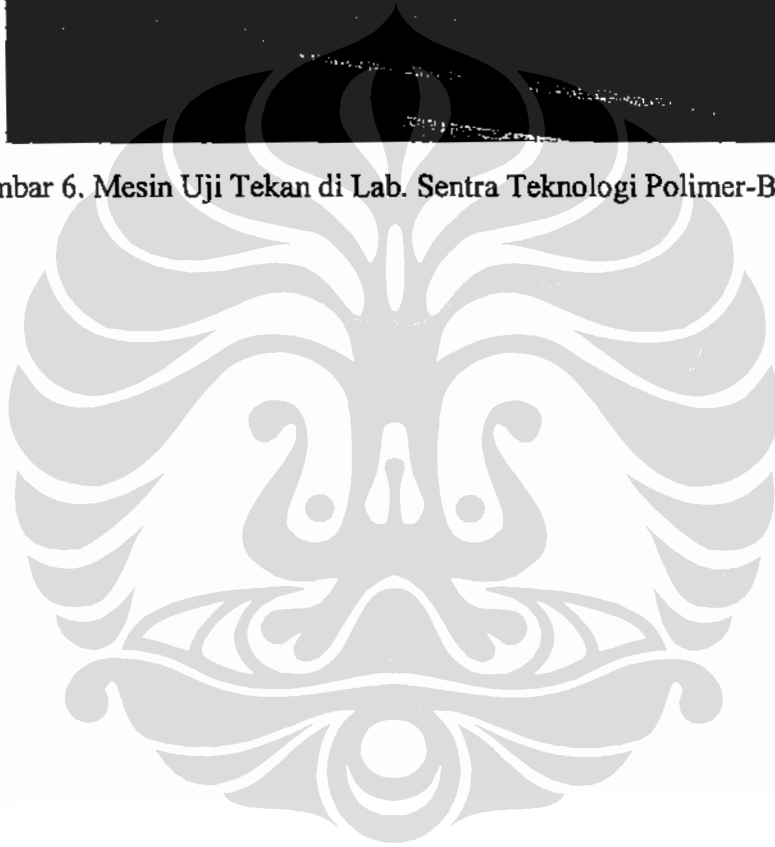
Gambar 4. Specimen untuk Karakterisasi Busa Aluminium



Gambar 5. Mesin Milling Serbuk *Planetary Ball Mill* (PBM 4A), Lab. Fisika-LIPI



Gambar 6. Mesin Uji Tekan di Lab. Sentra Teknologi Polimer-BPPT





LAMPIRAN 4
HASIL PERHITUNGAN BERAT JENIS BUSA
ALUMINIUM

Perhitungan Berat Jenis Sampel Hasil Percobaan

| Jenis Sampel | Berat Jenis (gr/cm ³) | | | | Berat Jenis Relatif | Keterangan |
|--------------|-----------------------------------|------------|------------|-----------|---------------------|------------|
| | Specimen 1 | Specimen 2 | Specimen 3 | Rata-Rata | | |
| A0 | 2,65 | 2,68 | 2,70 | 2,68 | 1,00 | |
| A1-5 | 1,32 | 1,58 | 1,05 | 1,31 | 0,49 | |
| A1-10 | 1,75 | 1,67 | 1,29 | 1,57 | 0,59 | |
| A1-15 | 2,08 | 1,93 | 1,93 | 1,98 | 0,74 | |
| A1-20 | 1,98 | 1,31 | 1,54 | 1,61 | 0,60 | |
| A2-5 | - | - | - | - | - | Rapuh |
| A2-10 | - | - | - | - | - | Rapuh |
| A2-15 | - | - | - | - | - | Rapuh |
| A2-20 | - | - | - | - | - | Rapuh |
| A3-5 | 2,63 | 2,54 | 2,67 | 2,61 | 0,97 | |
| A3-10 | 2,35 | 2,74 | 2,61 | 2,57 | 0,96 | |
| A3-15 | 2,53 | 2,70 | 2,56 | 2,60 | 0,97 | |
| A3-20 | 2,40 | 2,54 | 2,68 | 2,44 | 0,91 | |



LAMPIRAN 5
HASIL UJI TEKAN BUSA ALUMINIUM

Test Certificate Aluminium Compression Test

Teststandard.....E9-89a
 Tester.....abd
 Material..... Al-Foams

Tested on.....2008-05-15
 Kondisi uji.....21.4oC,RH63.5%

Testing machine.....AGS-G
 Pretension.....0.5N
 Gripped Length.....15.8 mm
 Test speed 10%→2.5 mm/min

Directory.....J1080216
 Parameterset....astm e9-89a

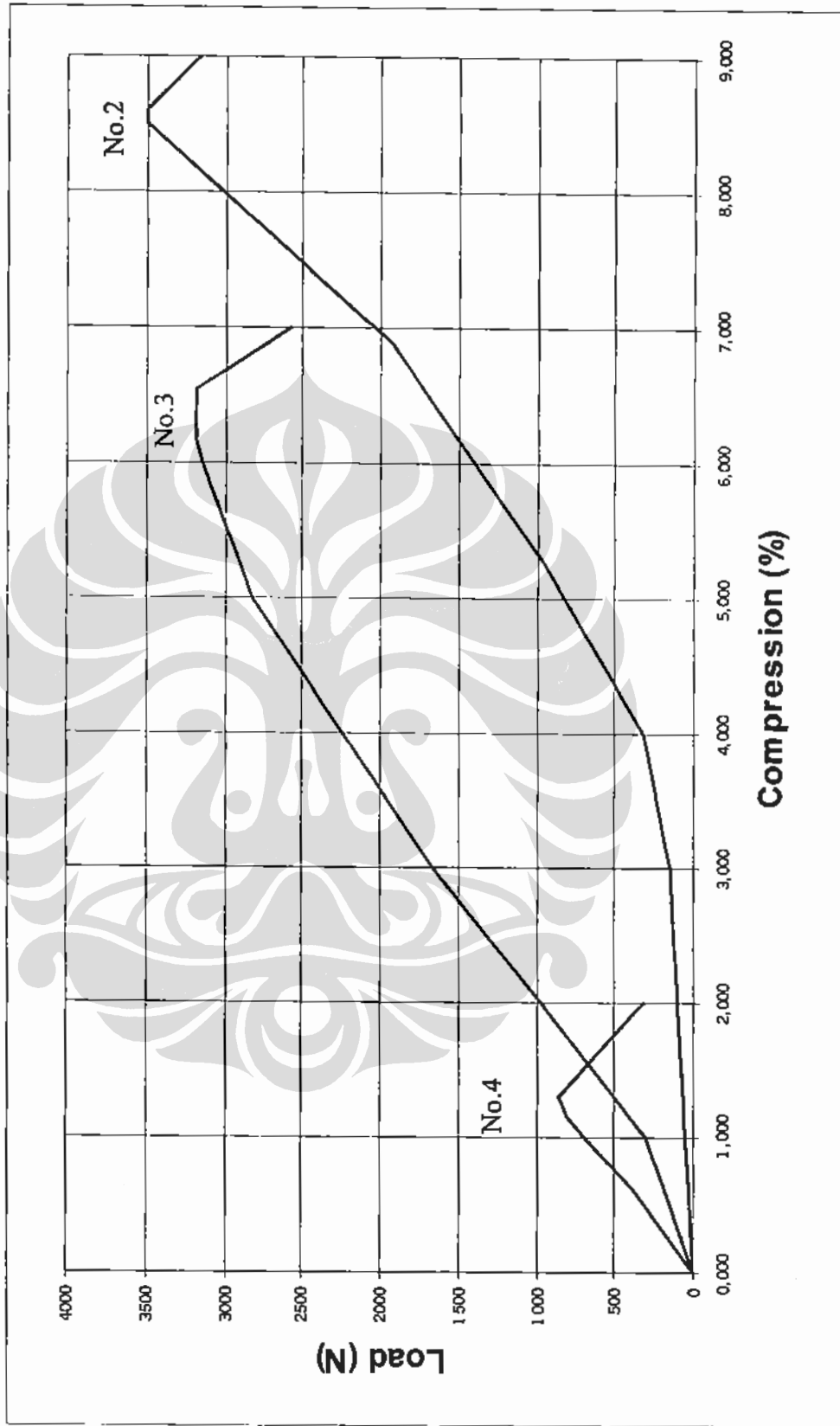
Legend

Bno.....Batch number
 b1.....Width 1
 b2.....Width 2

"M.....Compressive strength
 Fmax.....Maximum load
 Comment.....Comment

| Test No | BNo | b1 mm | b2 mm | "M MPa | Fmax N | Comment |
|---------|------------------|----------|----------|-----------|-----------|---------|
| 4 | Aluminium foam-3 | 8.10 | 8.10 | 48.16 | 3160 | |
| 10 | Aluminium foam-2 | 7.30 | 7.20 | 66.35 | 3488 | |
| 11 | Aluminium foam-4 | 7.10 | 8.14 | 14.80 | 855.5 | |
| Mean | | 7.50 | 7.81 | 43.10 | 2501 | |
| Minimum | | 7.10 | 7.20 | 14.80 | 855.5 | |
| Maximum | | 8.10 | 8.14 | 66.35 | 3488 | |

Test No. 4-11
J1080201, Material: Aluminium Foam



Test Certificate Aluminium Compression Test

Teststandard.....E9-89a
 Tester.....abd
 Material..... Al-Foams

Tested on.....2008-05-15
 Kondisi uji.....21.4oC,RH63.5%

Testing machine.....AGS-G
 Pretension.....0.5N
 Gripped Length.....17.3 mm
 Test speed 10%→2.5 mm/min

Directory....J1080216
 Parameterset....astm e9-89a

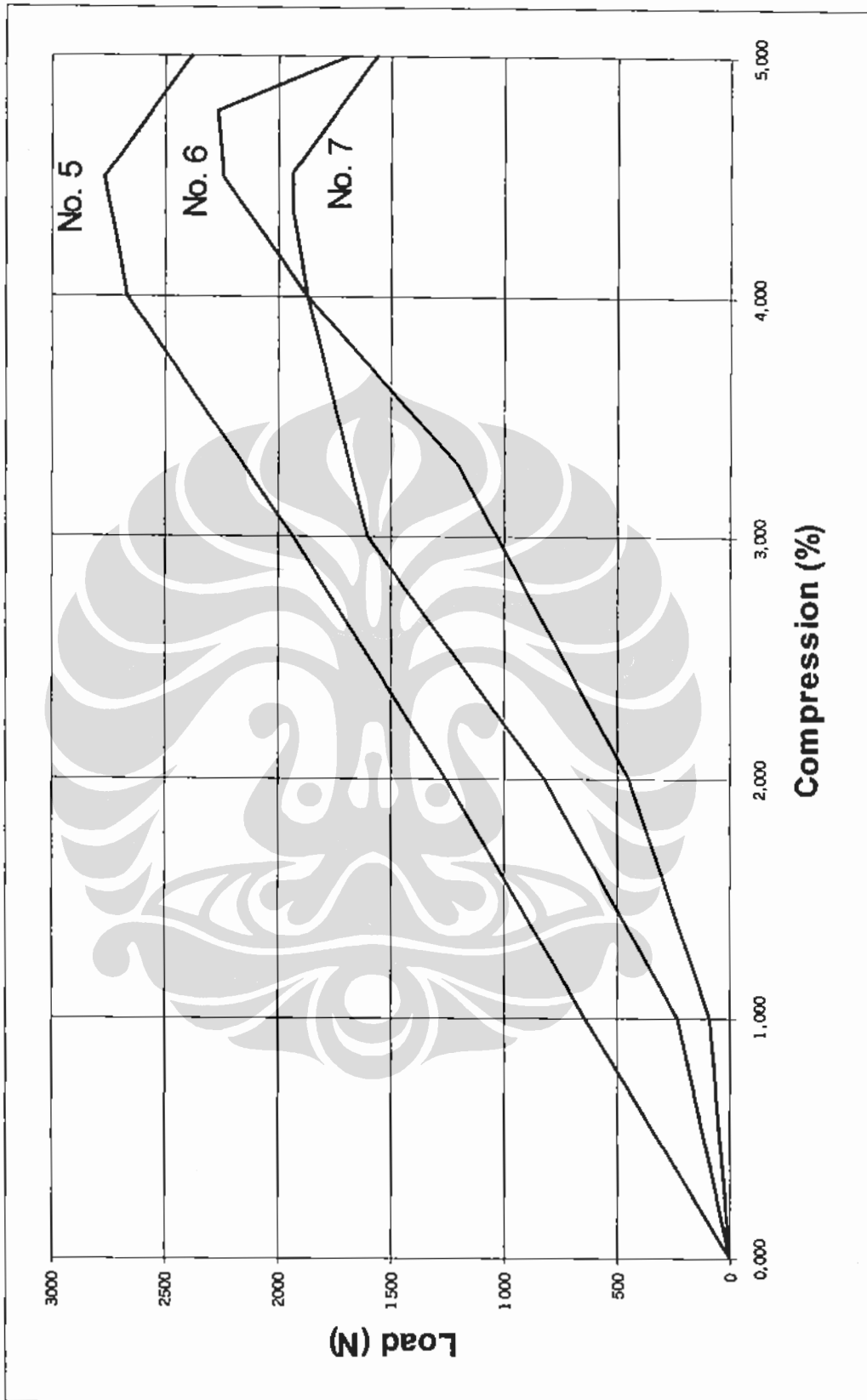
Legend

Bno.....Batch number
 b1.....Width 1
 b2.....Width 2

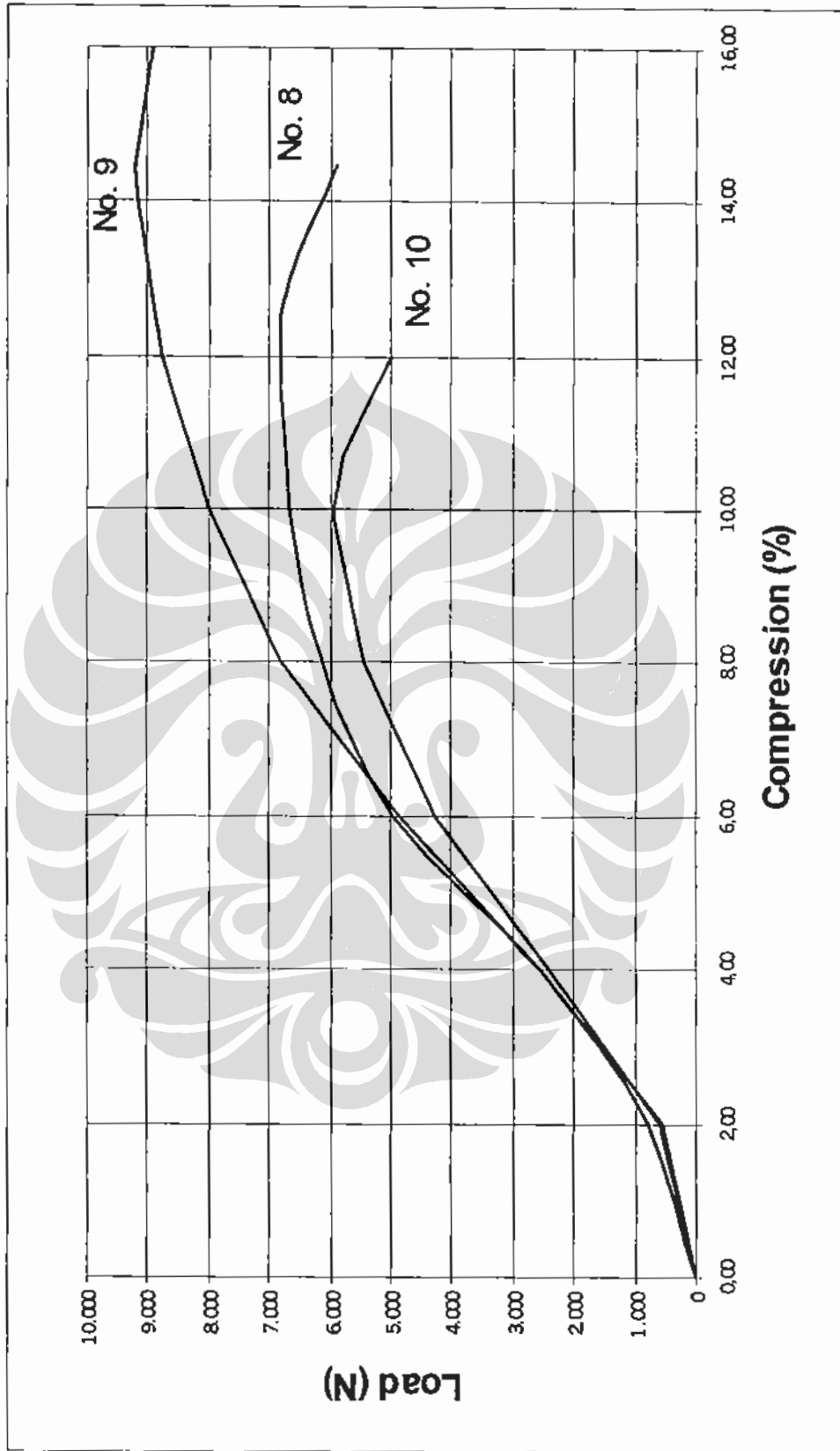
"M.....Compressive strength
 Fmax.....Maximum load
 Comment.....Comment

| Test No | BNo | b1 mm | b2 mm | "M MPa | Fmax N | Comment |
|---------|------------------|----------|----------|-----------|-----------|---------|
| 5 | Aluminium foam-5 | 7.32 | 7.38 | 50.97 | 2754 | |
| 7 | Aluminium foam-7 | 8.14 | 8.44 | 32.91 | 2261 | |
| 8 | Aluminium foam-6 | 8.56 | 8.54 | 26.11 | 1909 | |
| Mean | | 8.01 | 8.12 | 36.66 | 2308 | |
| Minimum | | 7.32 | 7.38 | 26.11 | 1909 | |
| Maximum | | 8.56 | 8.54 | 50.97 | 2754 | |

Test No. 5-8
J1080201, Material: Aluminium Foam



Test No. 2-9
J1080201, Material: Aluminium Foam



Test Certificate Aluminium Compression Test

Teststandard.....E9-89a
 Tester.....abd
 Material..... Al-Foams

Tested on.....2008-06-19
 Kondisi uji.....21.4oC,RH63.5%

Testing machine.....AGS-G
 Pretension.....0.5N
 Gripped Length.....16.0 mm
 Test speed 10%→2.5 mm/min

Directory....J1080216
 Parameterset....astm e9-89a

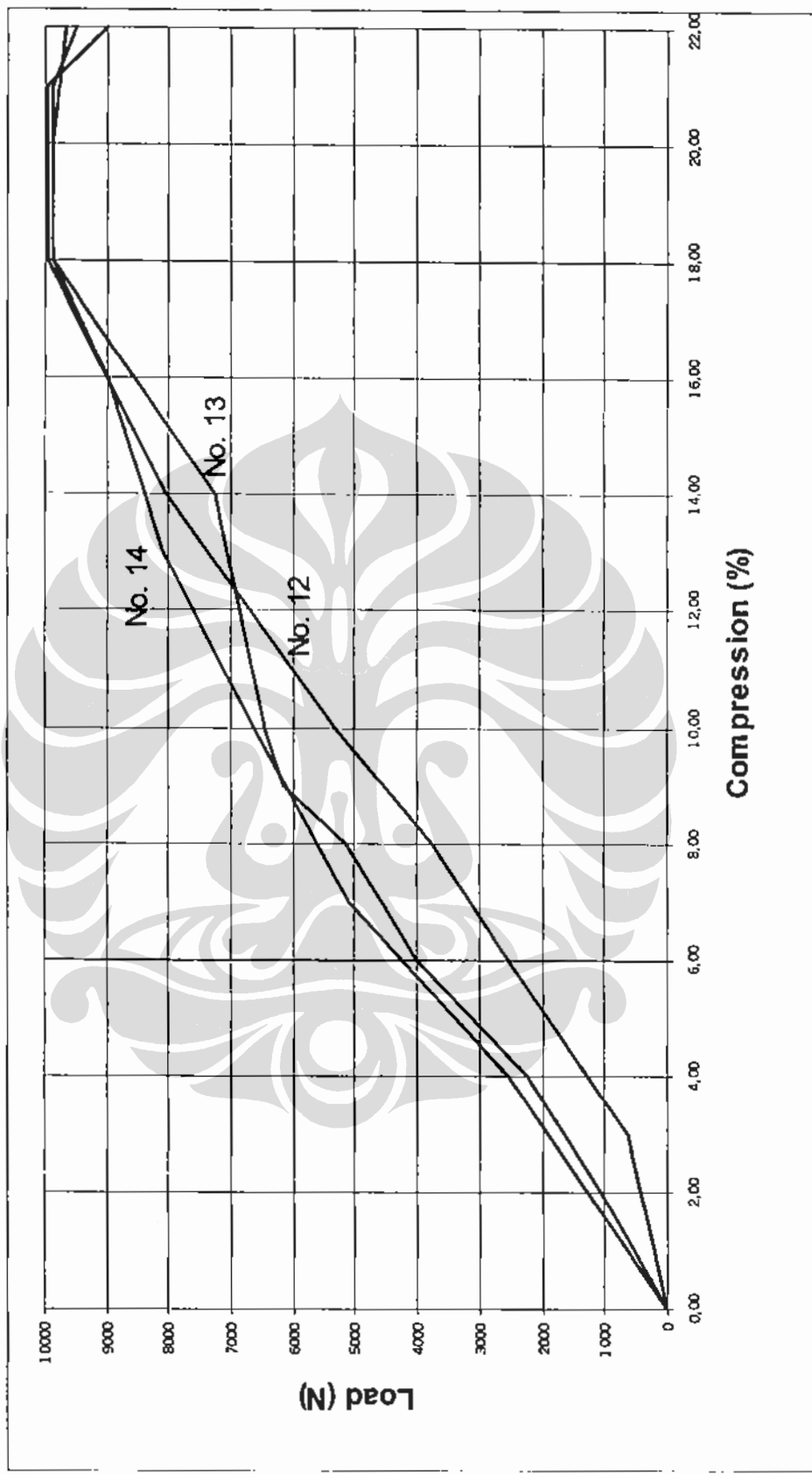
Legend

Bno.....Batch number
 b1.....Width 1
 b2.....Width 2

"M.....Compressive strength
 Fmax.....Maximum load
 Comment.....Comment

| Test No | BNo | b1 mm | b2 mm | "M MPa | Fmax N | Comment |
|---------|-------------------|----------|----------|-----------|-----------|---------|
| 12 | Aluminium foam-12 | 7.00 | 7.66 | 198.5 | 9965 | |
| 13 | Aluminium foam-13 | 7.20 | 7.14 | 192.3 | 9884 | |
| 14 | Aluminium foam-14 | 6.80 | 7.45 | 195.1 | 9880 | |
| Mean | | 7.00 | 7.42 | 195.3 | 9909.67 | |
| Minimum | | 6.80 | 7.14 | 192.1 | 9880 | |
| Maximum | | 7.20 | 7.66 | 198.5 | 9965 | |

Test No.12-14
J1080201, Material: Aluminium



Test Certificate Aluminium Compression Test

Teststandard.....E9-89a
 Tester.....abd
 Material..... Al-Foams

Tested on.....2008-06-19
 Kondisi uji.....21.4oC,RH63.5%

Testing machine.....AGS-G
 Pretension.....0.5N
 Gripped Length.....14 mm
 Test speed 10%→2.5 mm/min

Directory....J1080216
 Parameterset....astm e9-89a

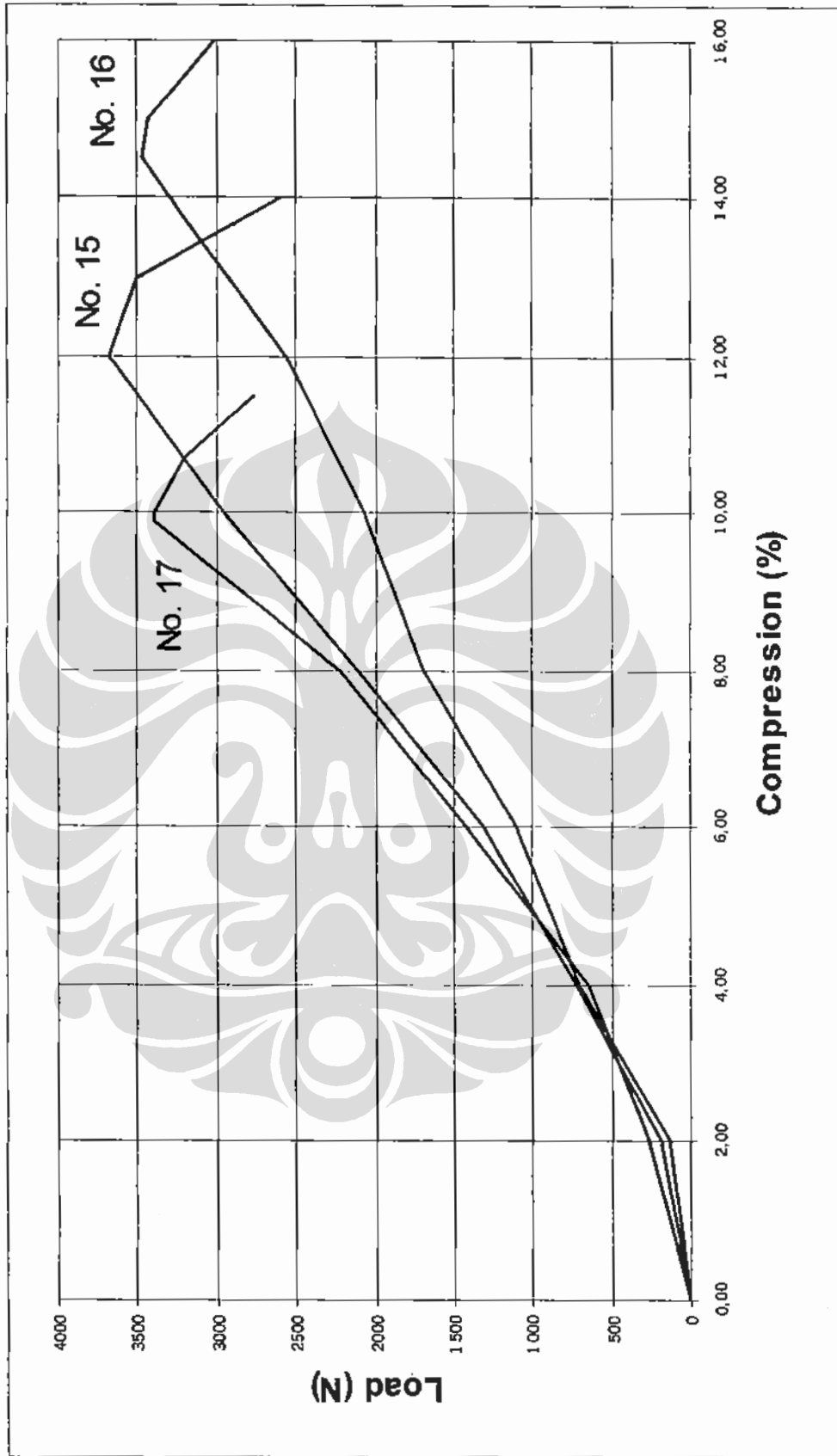
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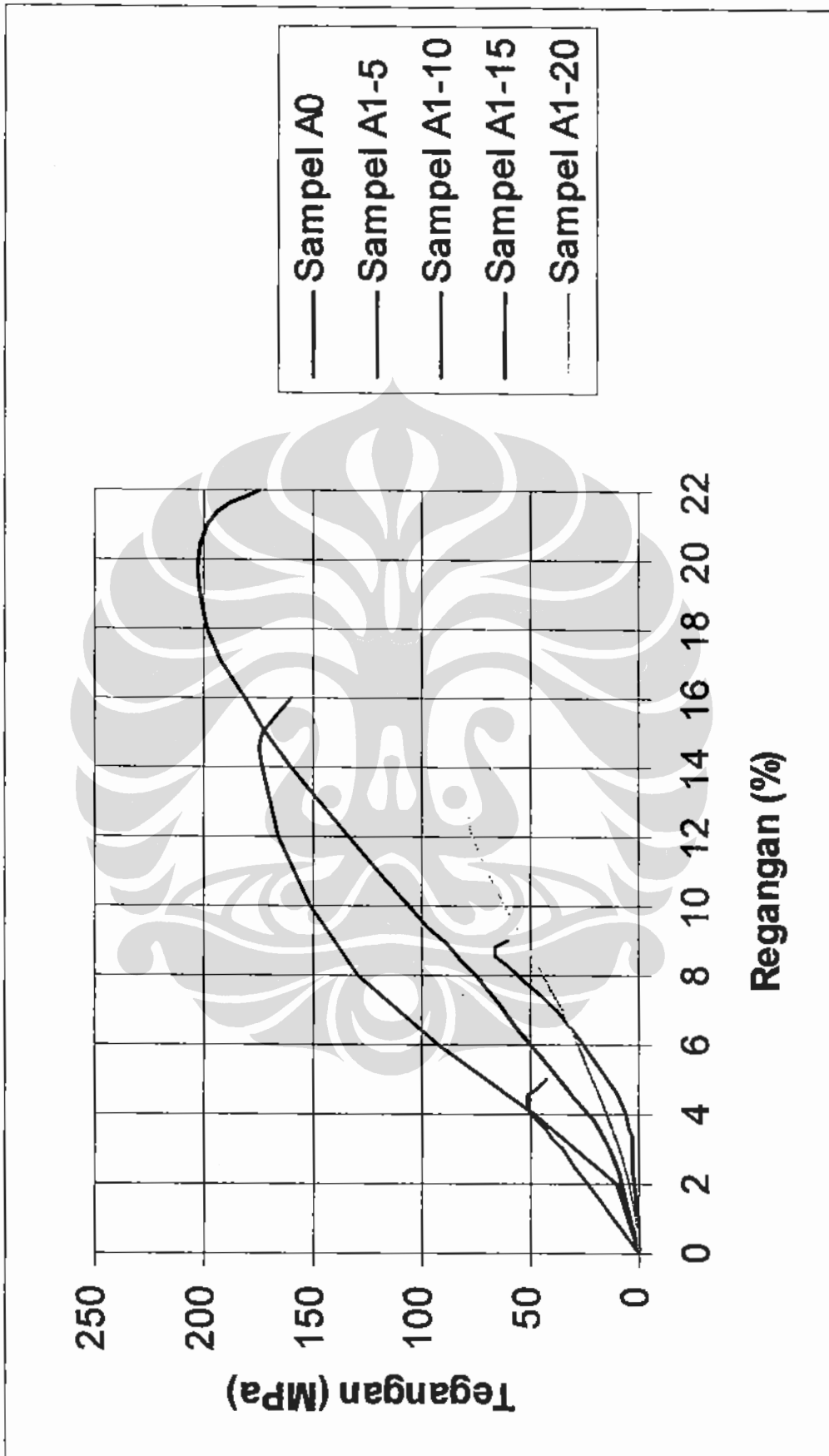
Bno.....Batch number
 b1.....Width 1
 b2.....Width 2

"M.....Compressive strength
 Fmax.....Maximum load
 Comment.....Comment

| Test No | BNo | b1 mm | b2 mm | "M MPa | Fmax N | Comment |
|---------|-------------------|----------|----------|-----------|-----------|---------|
| 15 | Aluminium foam-15 | 6.80 | 7.10 | 76.3 | 3677 | |
| 16 | Aluminium foam-17 | 7.00 | 7.22 | 68.7 | 3473 | |
| 17 | Aluminium foam-16 | 6.53 | 7.20 | 72.2 | 3394 | |
| Mean | | 6.78 | 7.17 | 72.4 | 3514.67 | |
| Minimum | | 6.53 | 7.10 | 68.7 | 3394 | |
| Maximum | | 7.00 | 7.22 | 76.3 | 3677 | |

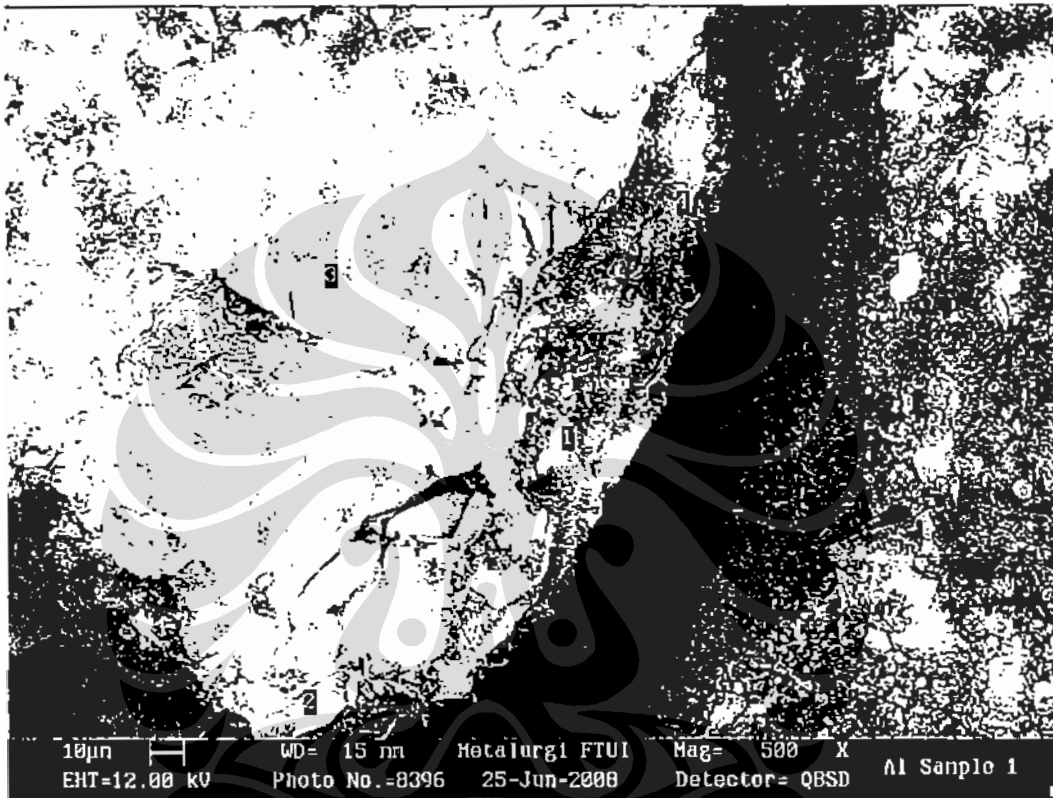
Test No.15-17
J1080201, Material: Aluminium Foam





Grafik Kuat Tekan Maksimum Sampel Pengujian Busa Aluminium dengan Serbuk Alumina 5,77 μm





Hasil Pengujian SEM dengan Sampel Al-20

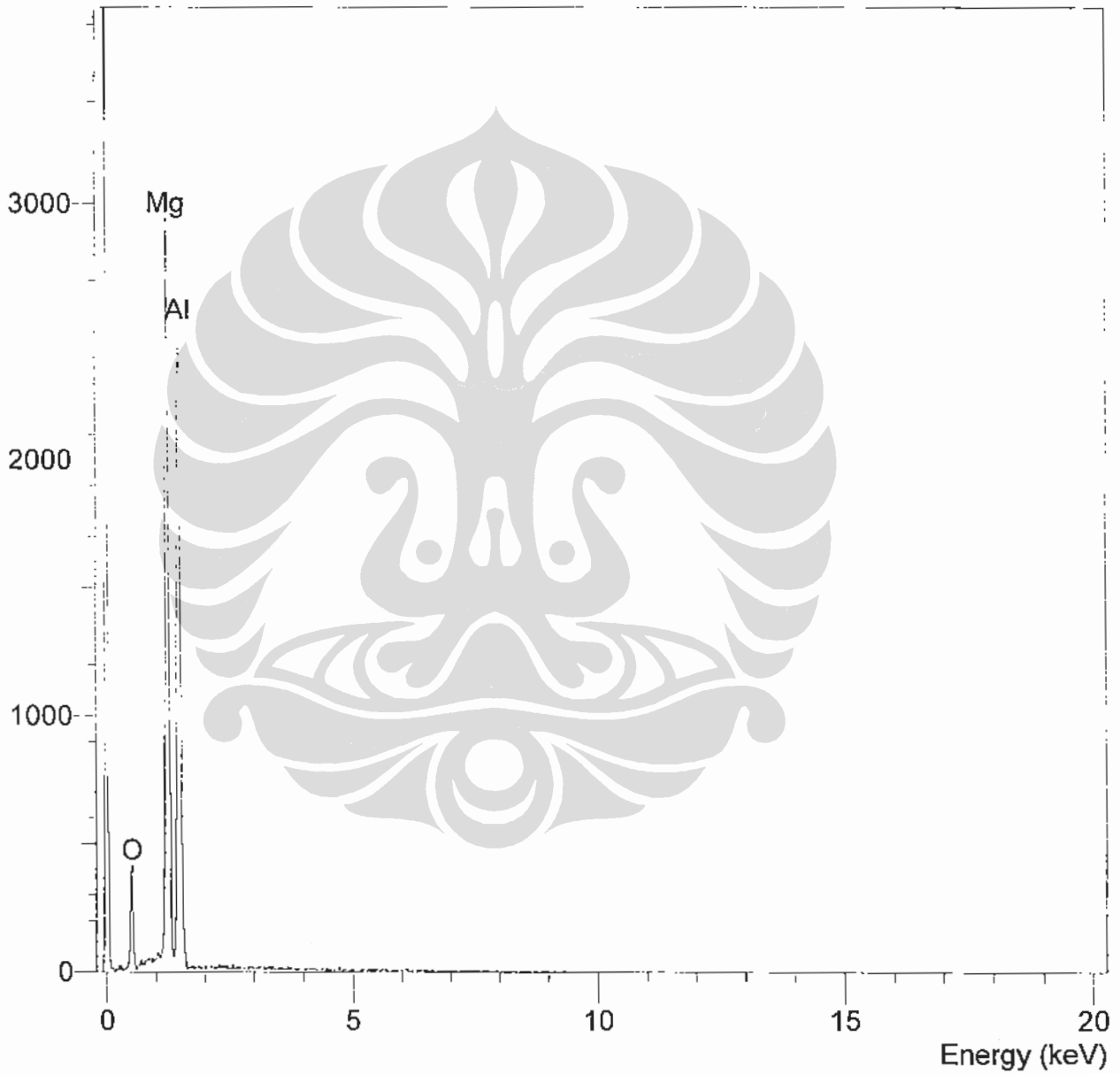
Operator : jaya

Client : Dept. Metalurgi dan Material Universitas Indonesia

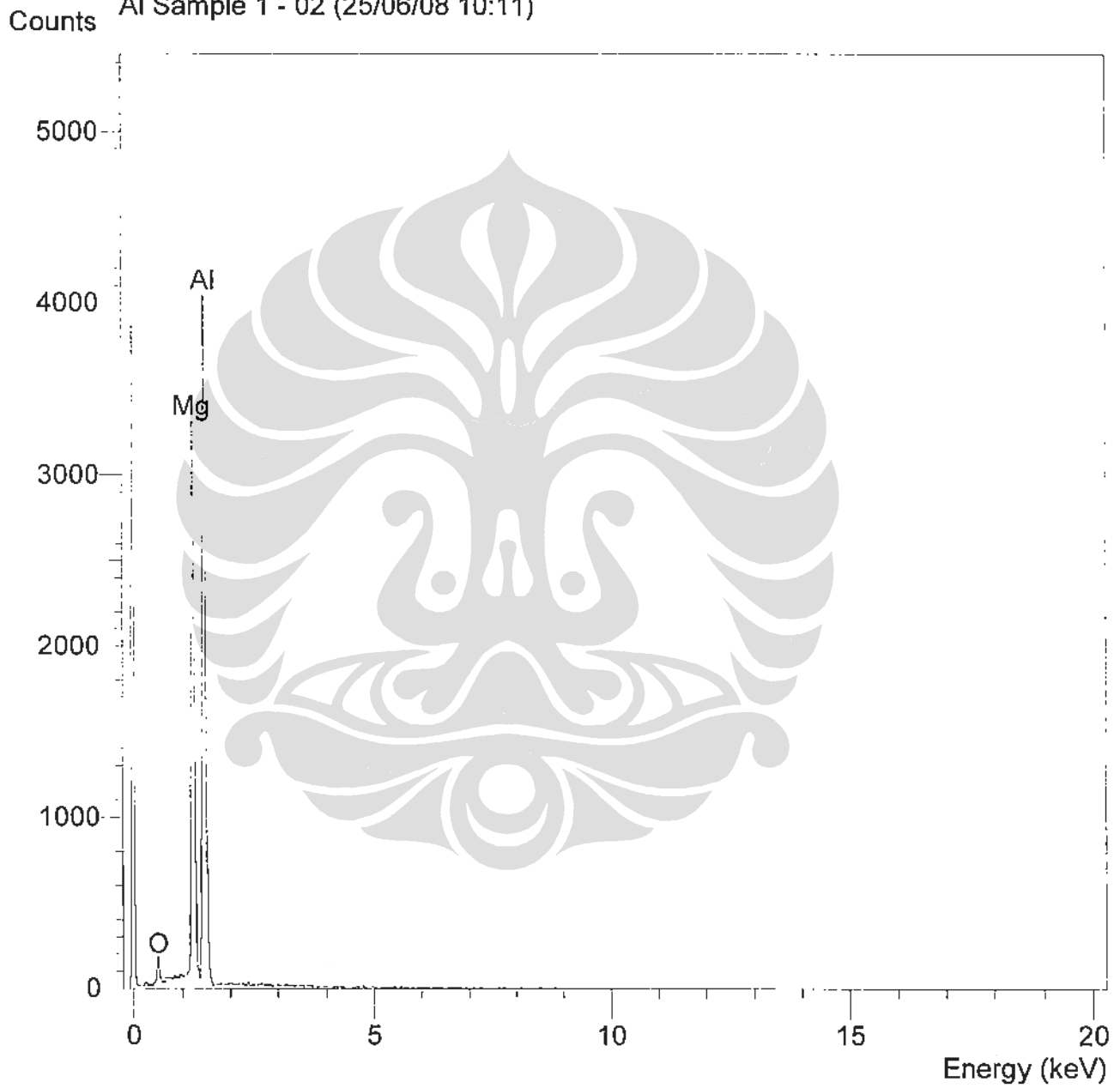
Job : Energy Dispersive X-Ray Analysis

Al Sample 1 (25/06/08 10:08)

Counts

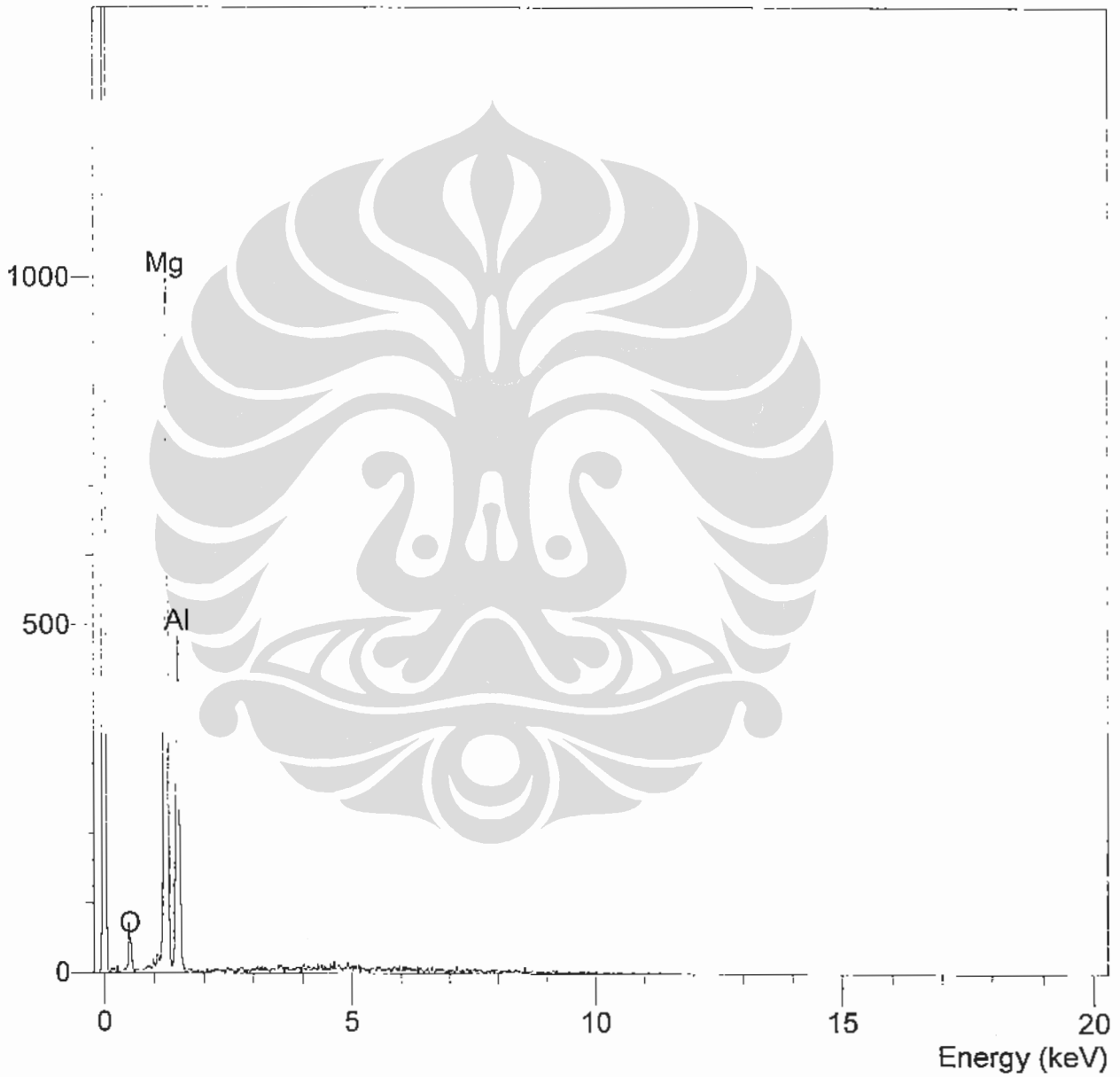


Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 1 - 02 (25/06/08 10:11)

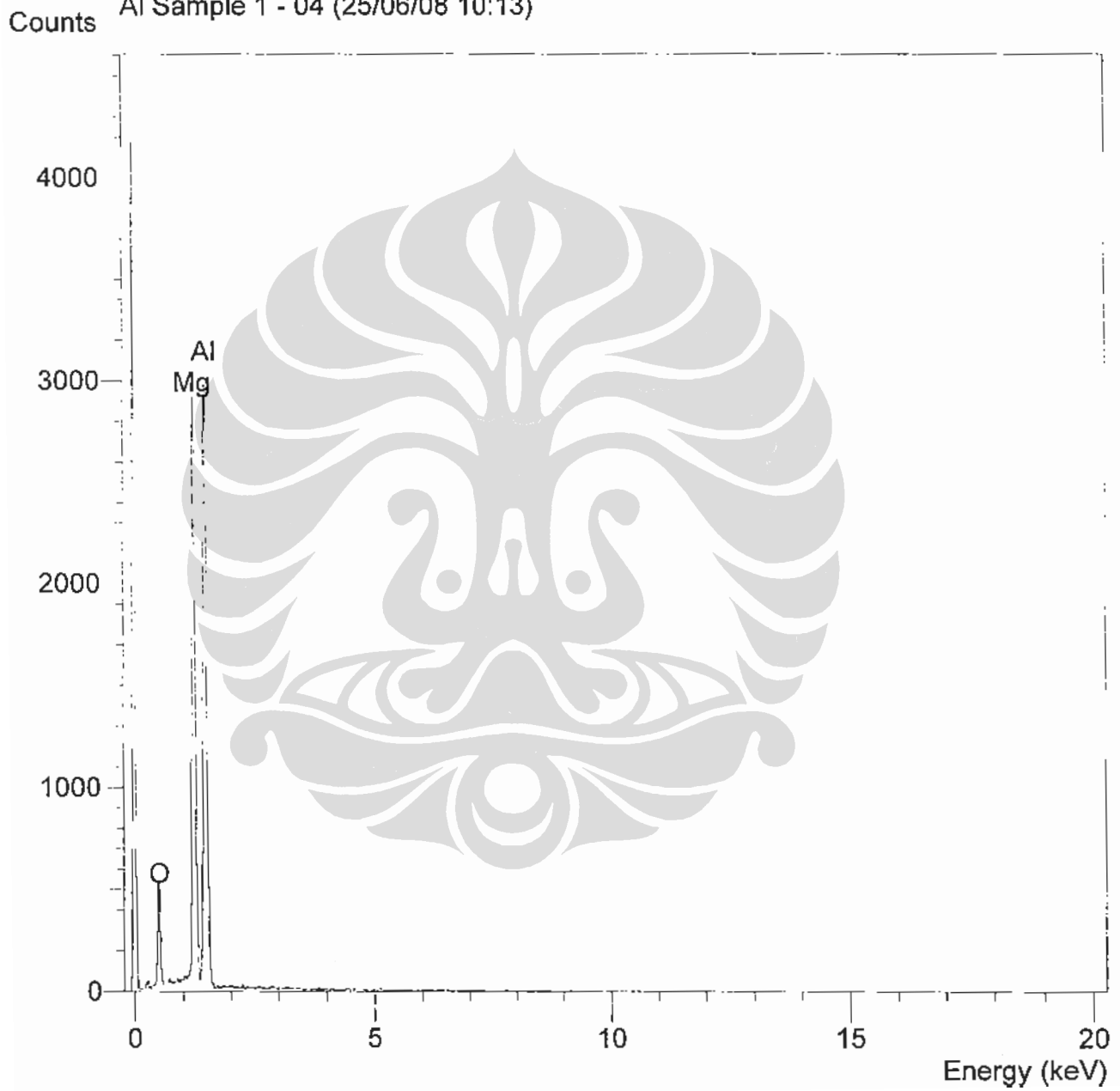


Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
AL Sample 1 - 03 (25/06/08 10:12)

Counts



Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 1 - 04 (25/06/08 10:13)



SEMQuant results. Listed at 12:14:11 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 1

1202

System resolution = 59 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

1 peak possibly omitted: 0.00 keV

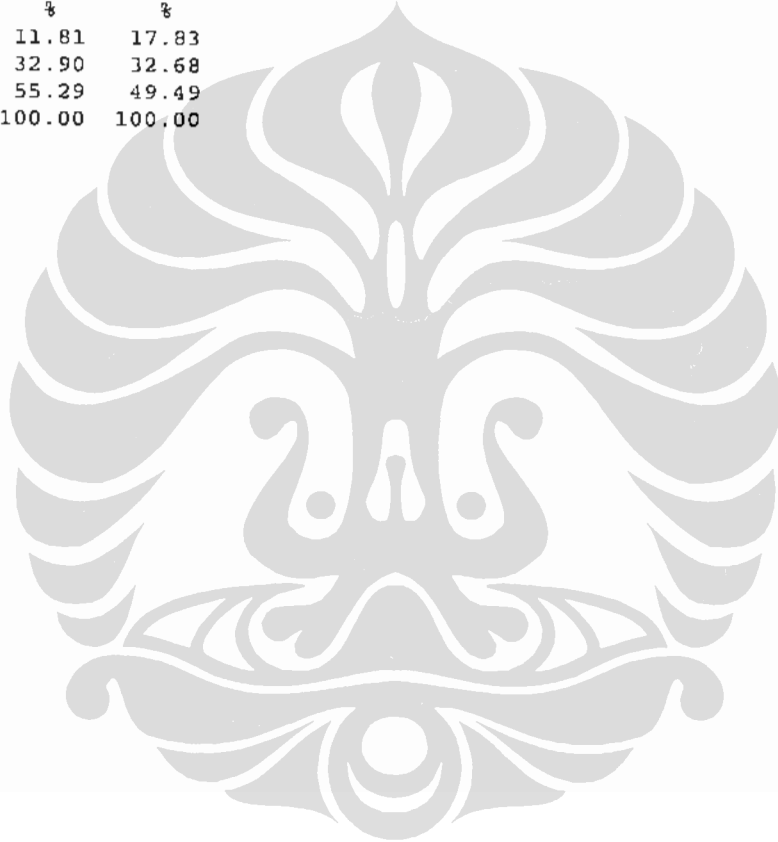
Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

9.7

| Elmt | Spect. Type | Element % | Atomic % |
|-------|-------------|-----------|----------|
| O K | ED | 11.81 | 17.83 |
| Mg K | ED | 32.90 | 32.68 |
| Al K | ED | 55.29 | 49.49 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 12:59:52 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 1 - 02

System resolution = 59 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

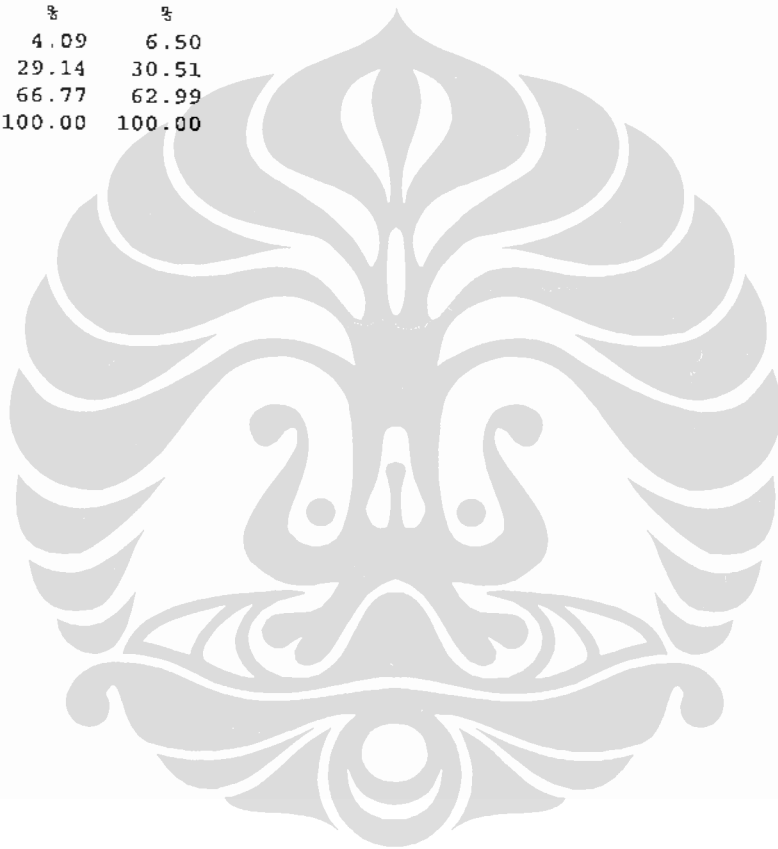
1 peak possibly omitted: 0.00 keV

Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. Type | Element % | Atomic % |
|-------|----------------|--------------|-------------|
| O K | ED | 4.09 | 6.50 |
| Mg K | ED | 29.14 | 30.51 |
| Al K | ED | 66.77 | 62.99 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:00:13 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: AL Sample 1 - 03

System resolution = 59 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

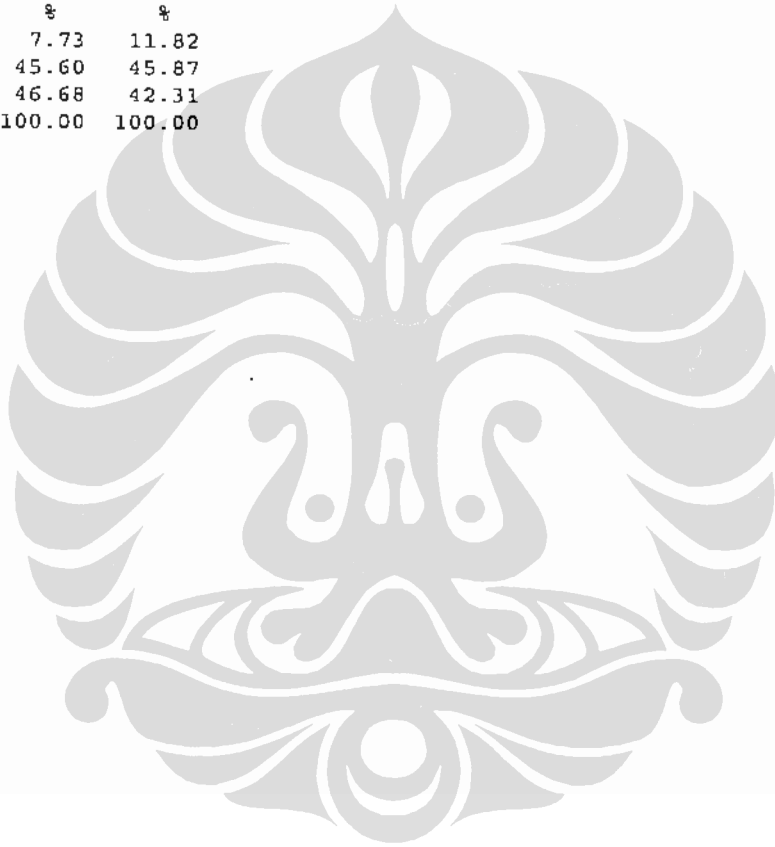
1 peak possibly omitted: 0.00 keV

Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. Type | Element % | Atomic % |
|-------|-------------|-----------|----------|
| O K | ED | 7.73 | 11.82 |
| Mg K | ED | 45.60 | 45.87 |
| Al K | ED | 46.68 | 42.31 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:00:51 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 1 - 04

System resolution = 59 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

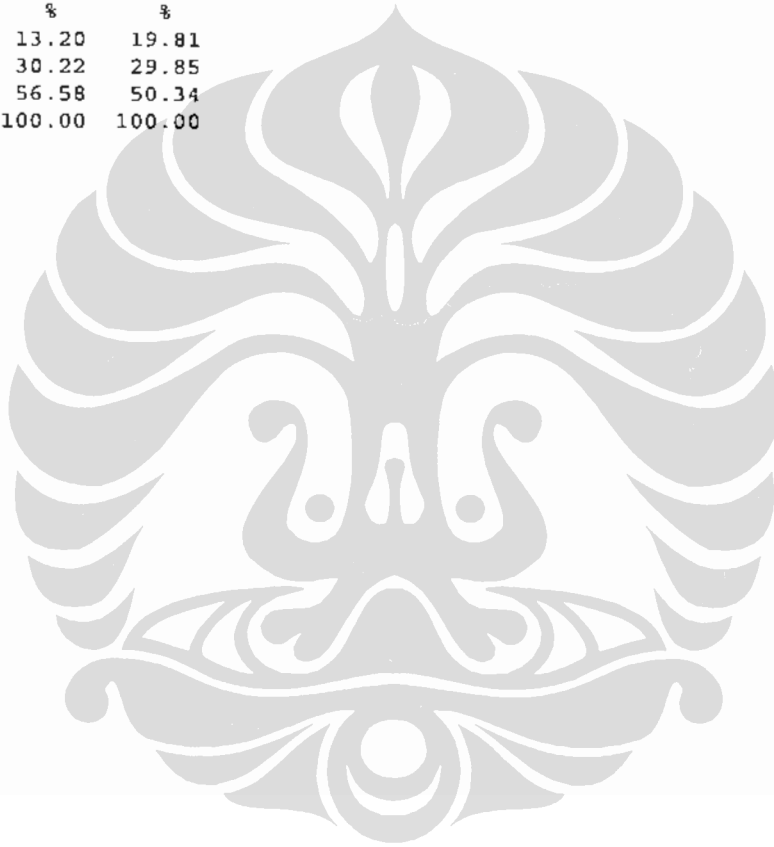
1 peak possibly omitted: 0.00 keV

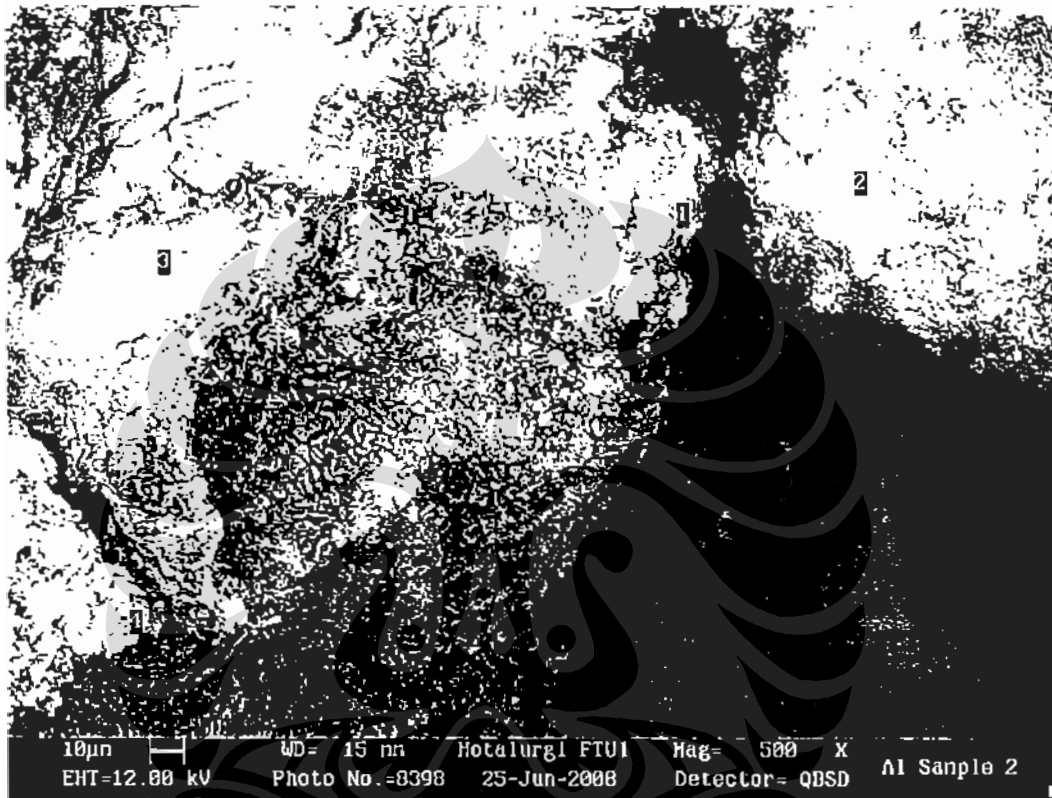
Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. Type | Element % | Atomic % |
|-------|-------------|-----------|----------|
| O K | ED | 13.20 | 19.81 |
| Mg K | ED | 30.22 | 29.85 |
| Al K | ED | 56.58 | 50.34 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma

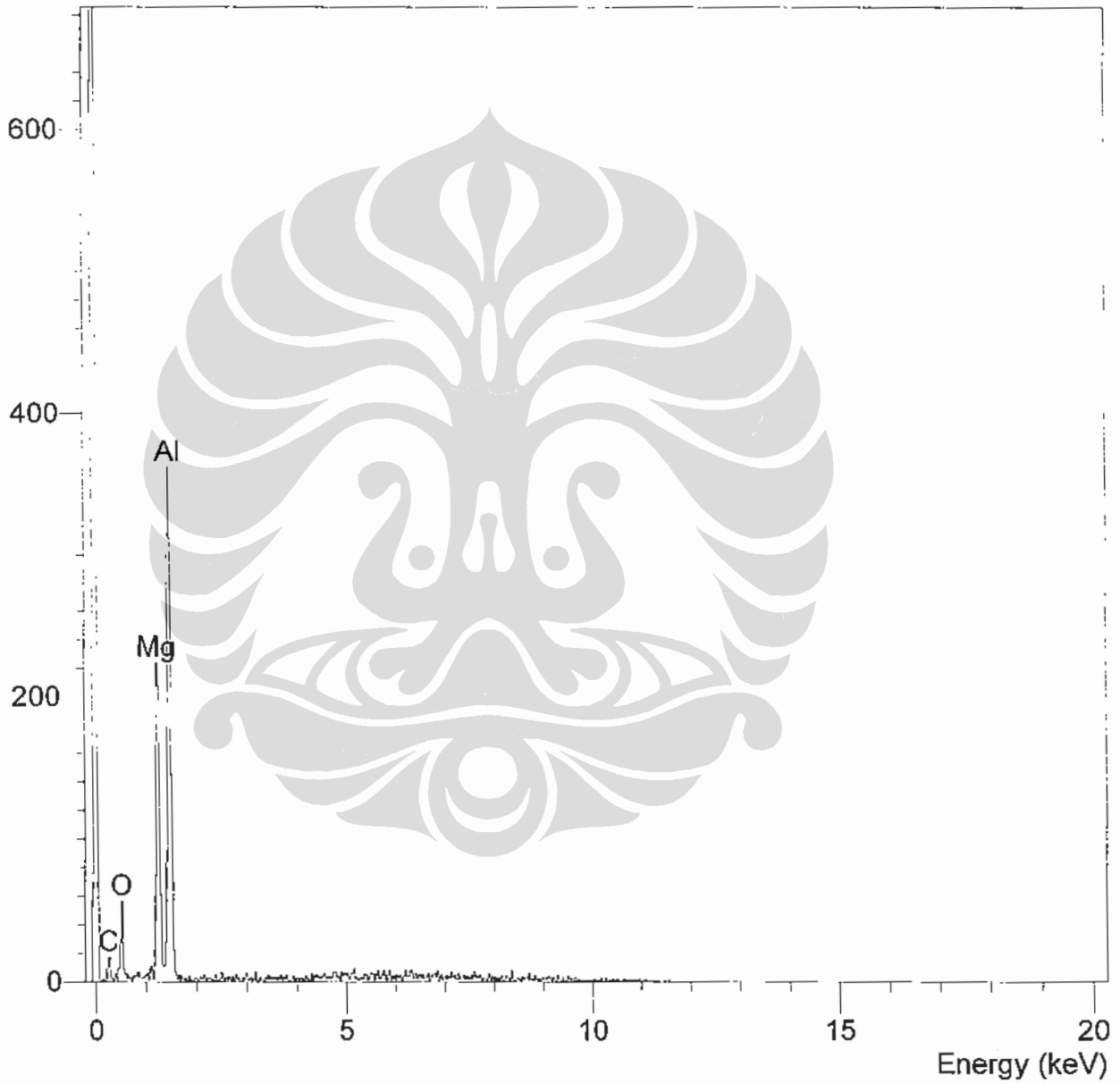




Hasil Pengujian SEM dengan Sampel A1-15

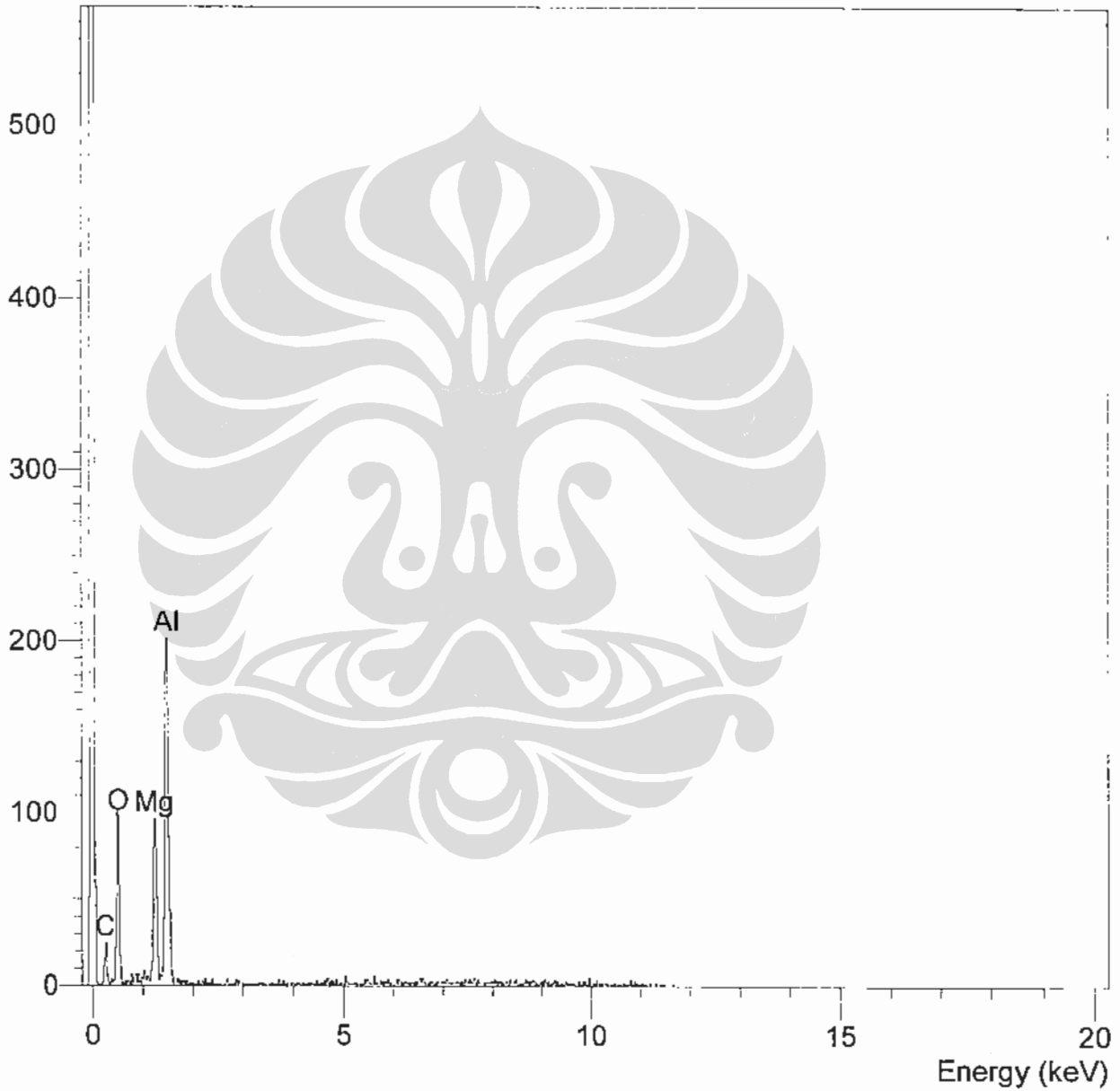
Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 2 - 01 (25/06/08 10:22)

Counts

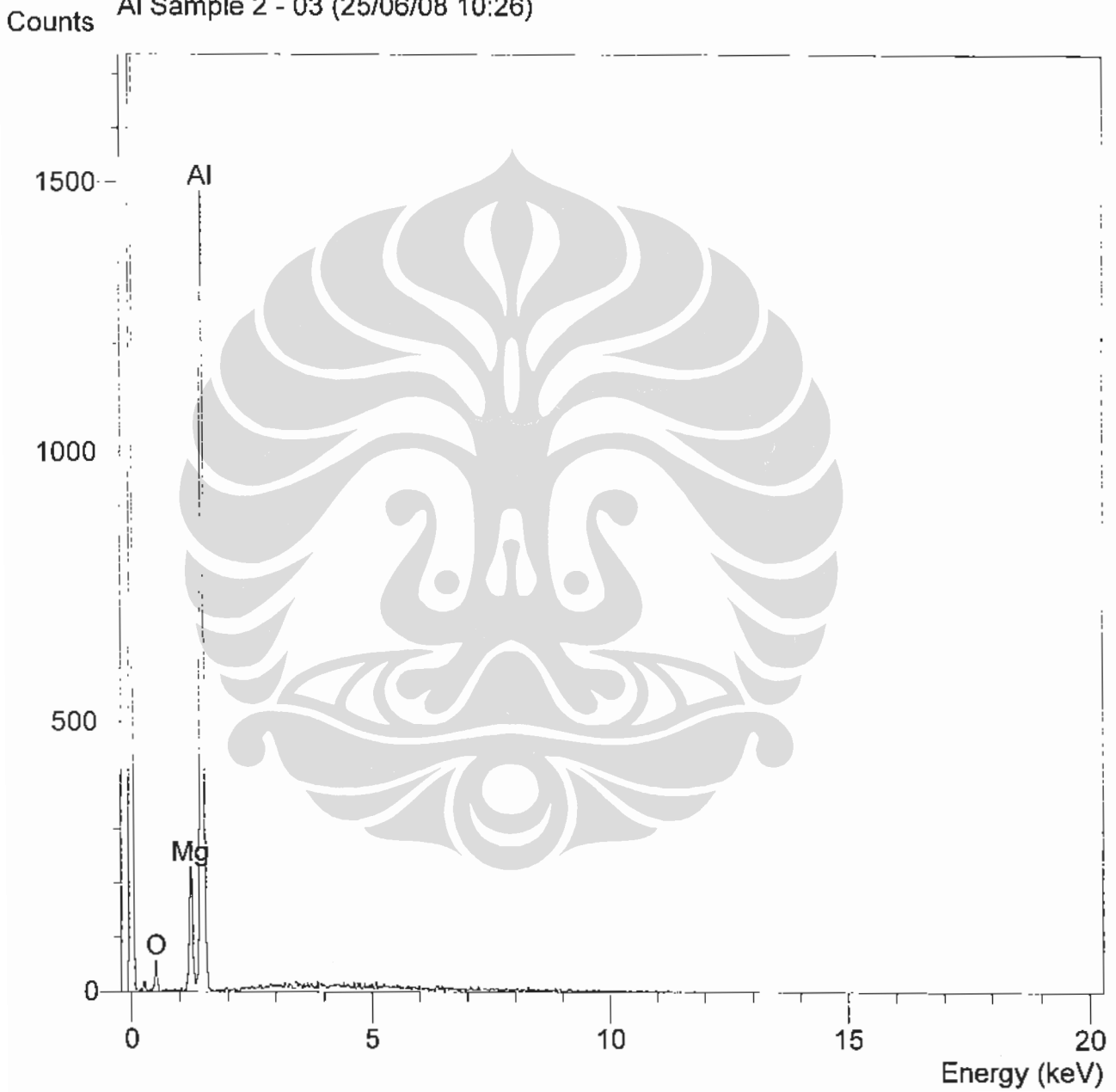


Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 2 - 02 (25/06/08 10:25)

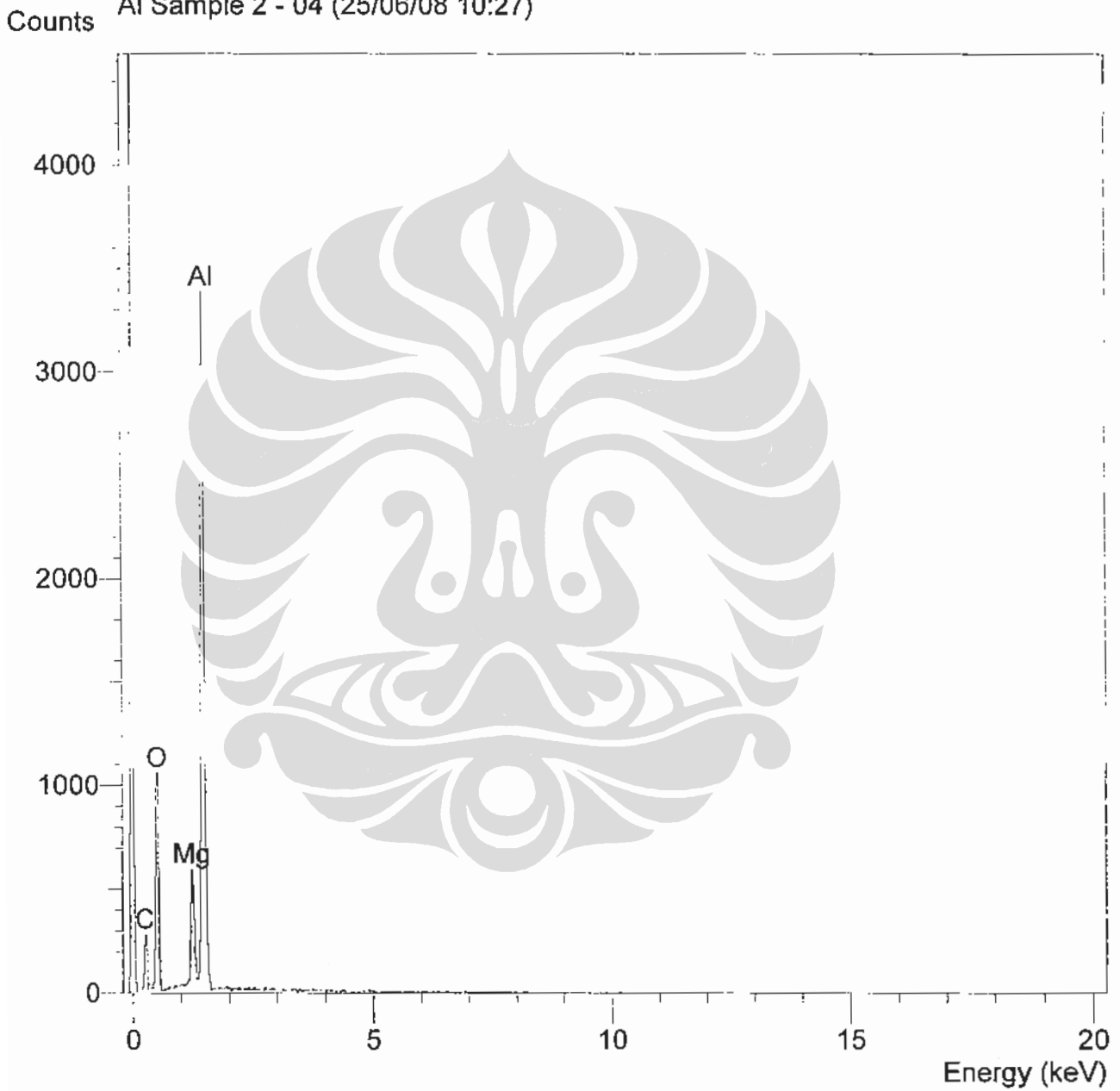
Counts



Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 2 - 03 (25/06/08 10:26)



Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 2 - 04 (25/06/08 10:27)



SEMQuant results. Listed at 13:01:57 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 2 - 01 / 157 W

System resolution = 59 eV

Quantitative method: ZAF (2 iterations).
Analysed all elements and normalised results.

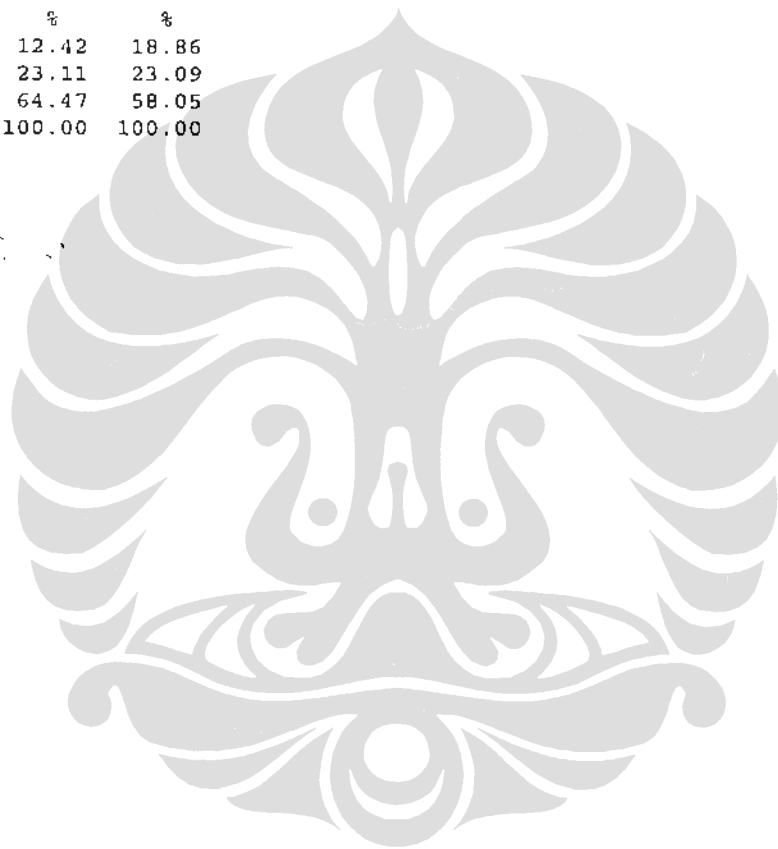
1 peak possibly omitted: 0.00 keV

Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. Type | Element % | Atomic % |
|-------|-------------|-----------|----------|
| O K | ED | 12.42 | 18.86 |
| Mg K | ED | 23.11 | 23.09 |
| Al K | ED | 64.47 | 58.05 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:03:22 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 2 - 02

System resolution = 59 eV

Quantitative method: ZAF (2 iterations).
Analysed all elements and normalised results.

1 peak possibly omitted: 0.00 keV

Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. | Element | Atomic |
|-------|--------|---------|--------|
| | Type | % | % |
| O K | ED | 34.05 | 45.88 |
| Mg K | ED | 16.24 | 14.40 |
| Al K | ED | 49.71 | 39.72 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:03:56 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 2 - 03

System resolution = 59 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

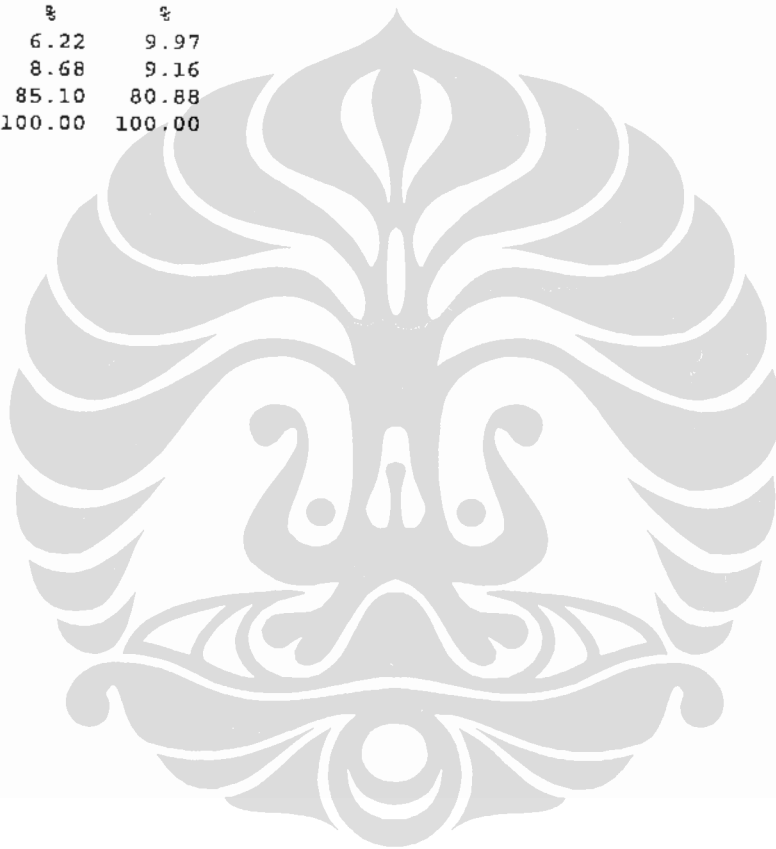
1 peak possibly omitted: 0.00 keV

Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. Type | Element % | Atomic % |
|-------|-------------|-----------|----------|
| O K | ED | 6.22 | 9.97 |
| Mg K | ED | 8.68 | 9.16 |
| Al K | ED | 85.10 | 80.88 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:04:15 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 2 - 04

System resolution = 59 eV

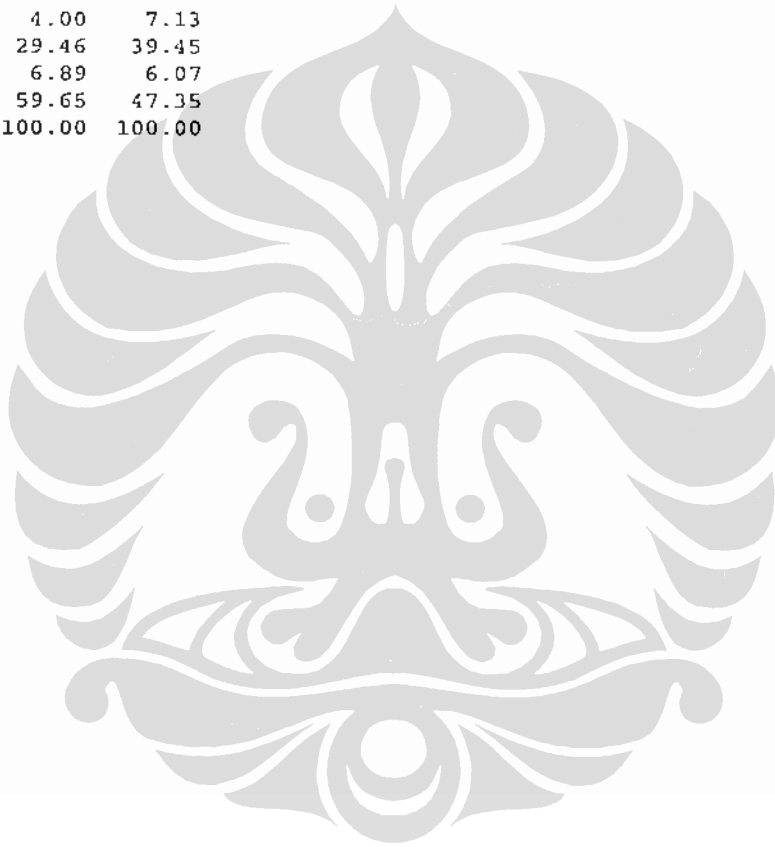
Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

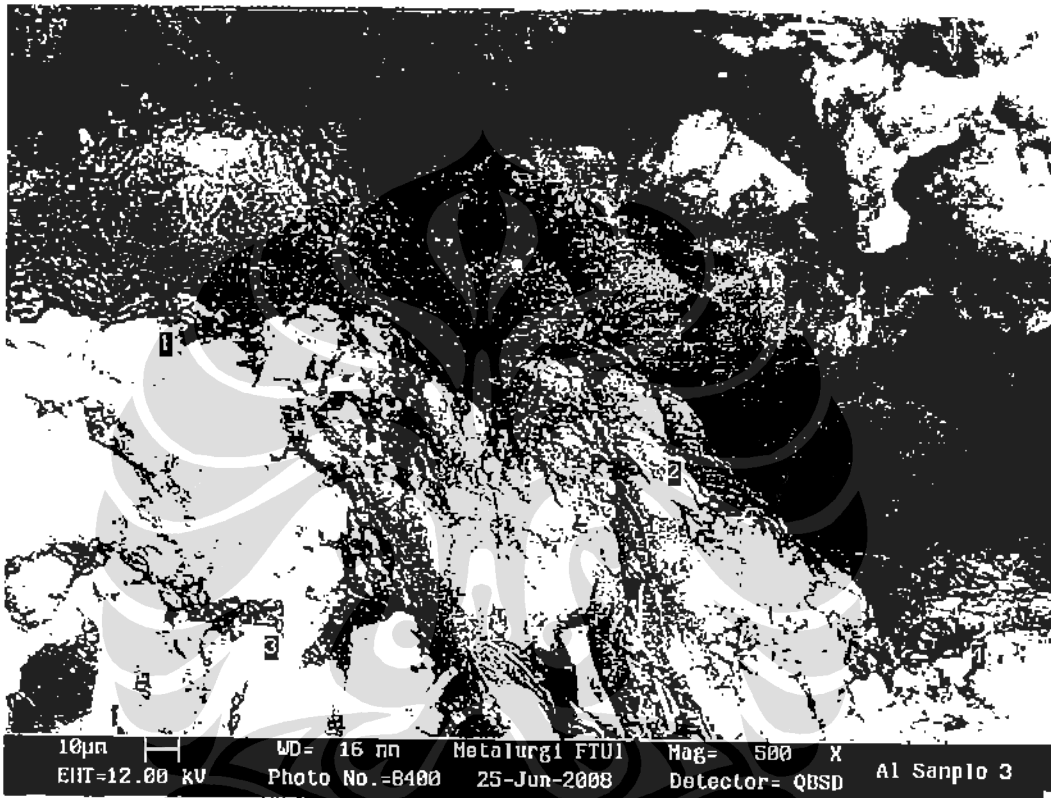
Standards :

C K Carbon Low 13/09/06
O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. | Element | Atomic |
|-------|--------|---------|--------|
| | Type | % | % |
| C K | ED | 4.00 | 7.13 |
| O K | ED | 29.46 | 39.45 |
| Mg K | ED | 6.89 | 6.07 |
| Al K | ED | 59.65 | 47.35 |
| Total | | 100.00 | 100.00 |

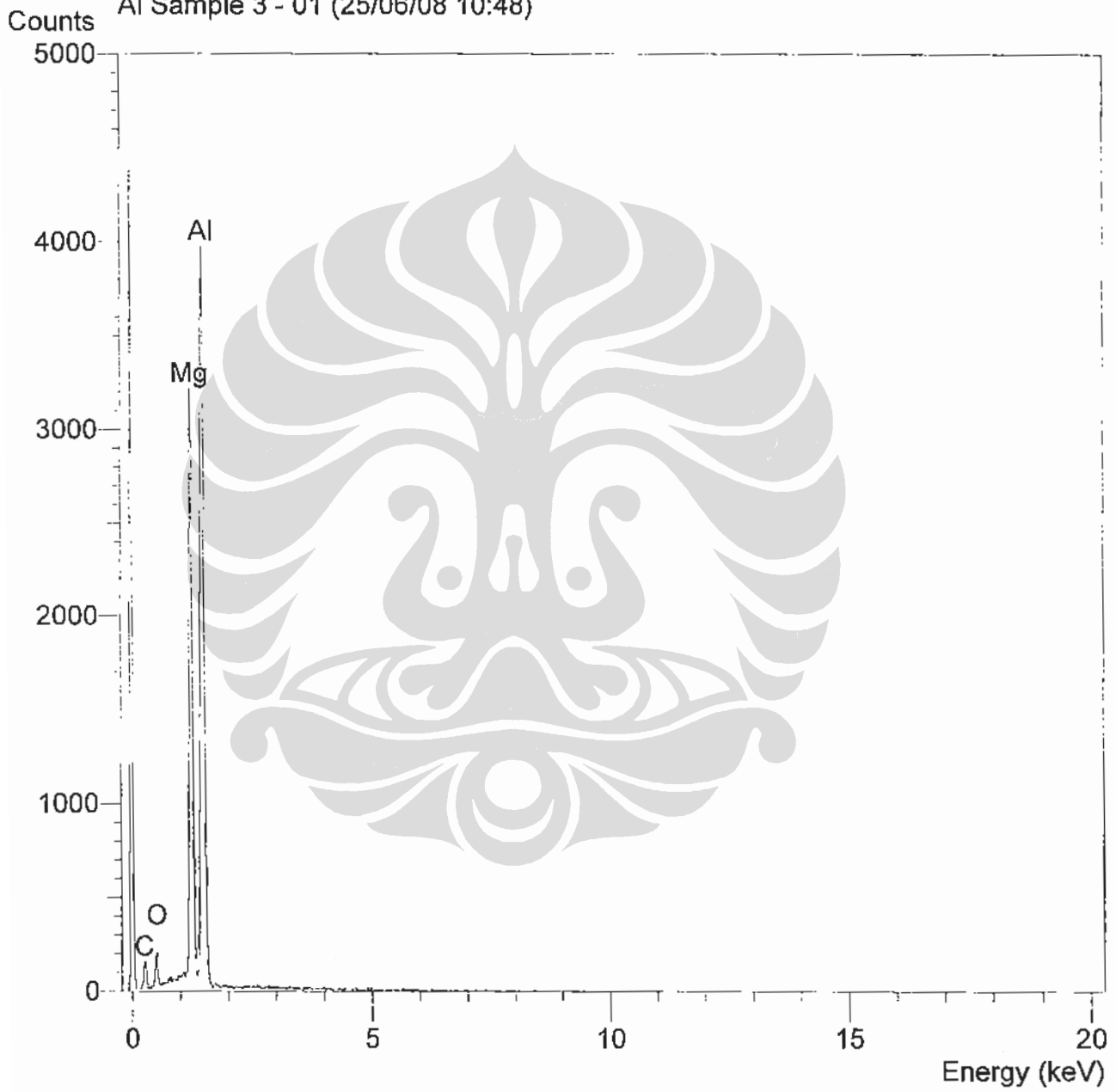
* = <2 Sigma



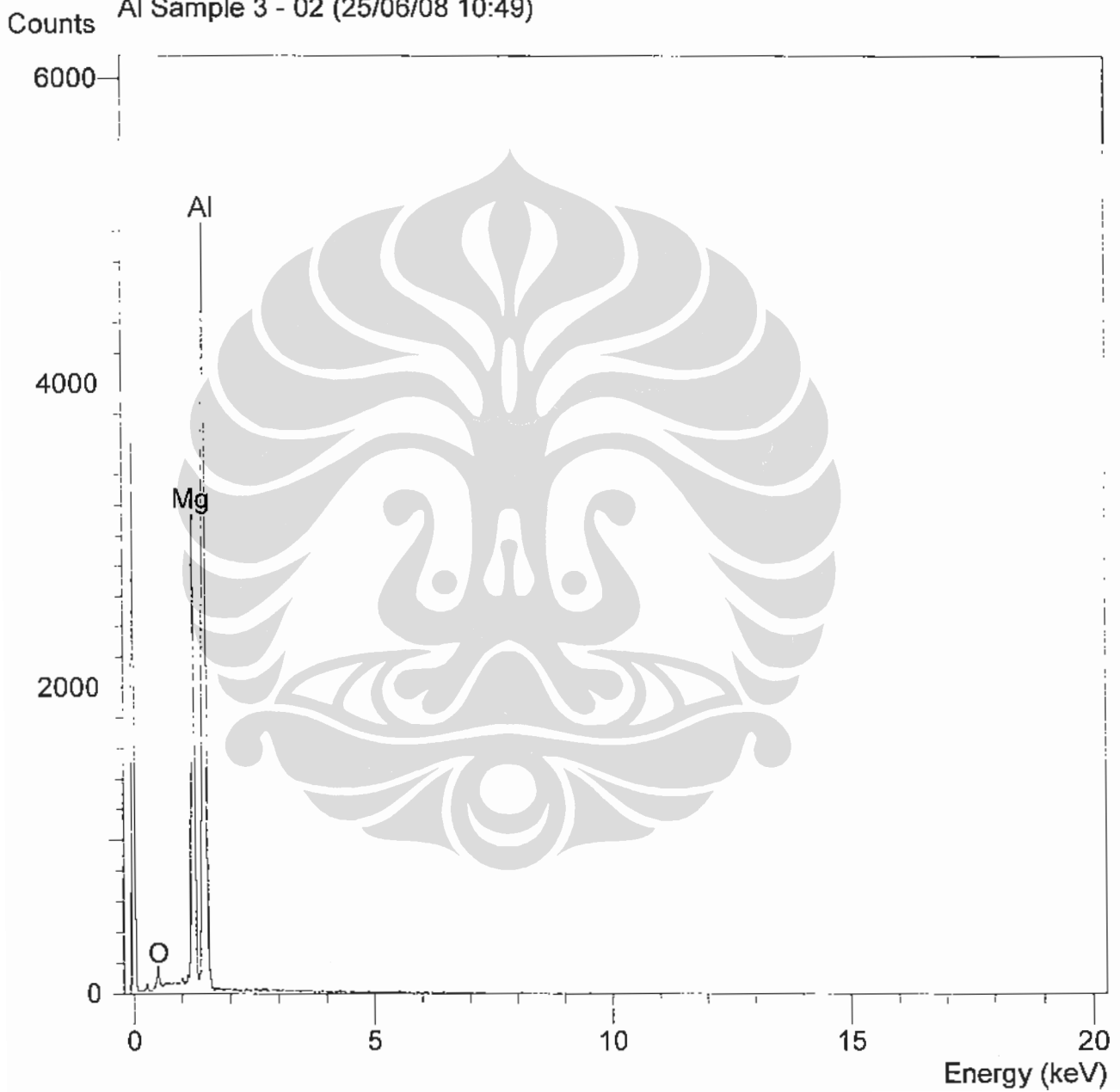


Hasil Pengujian SEM dengan Sampel A1-10

Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 3 - 01 (25/06/08 10:48)

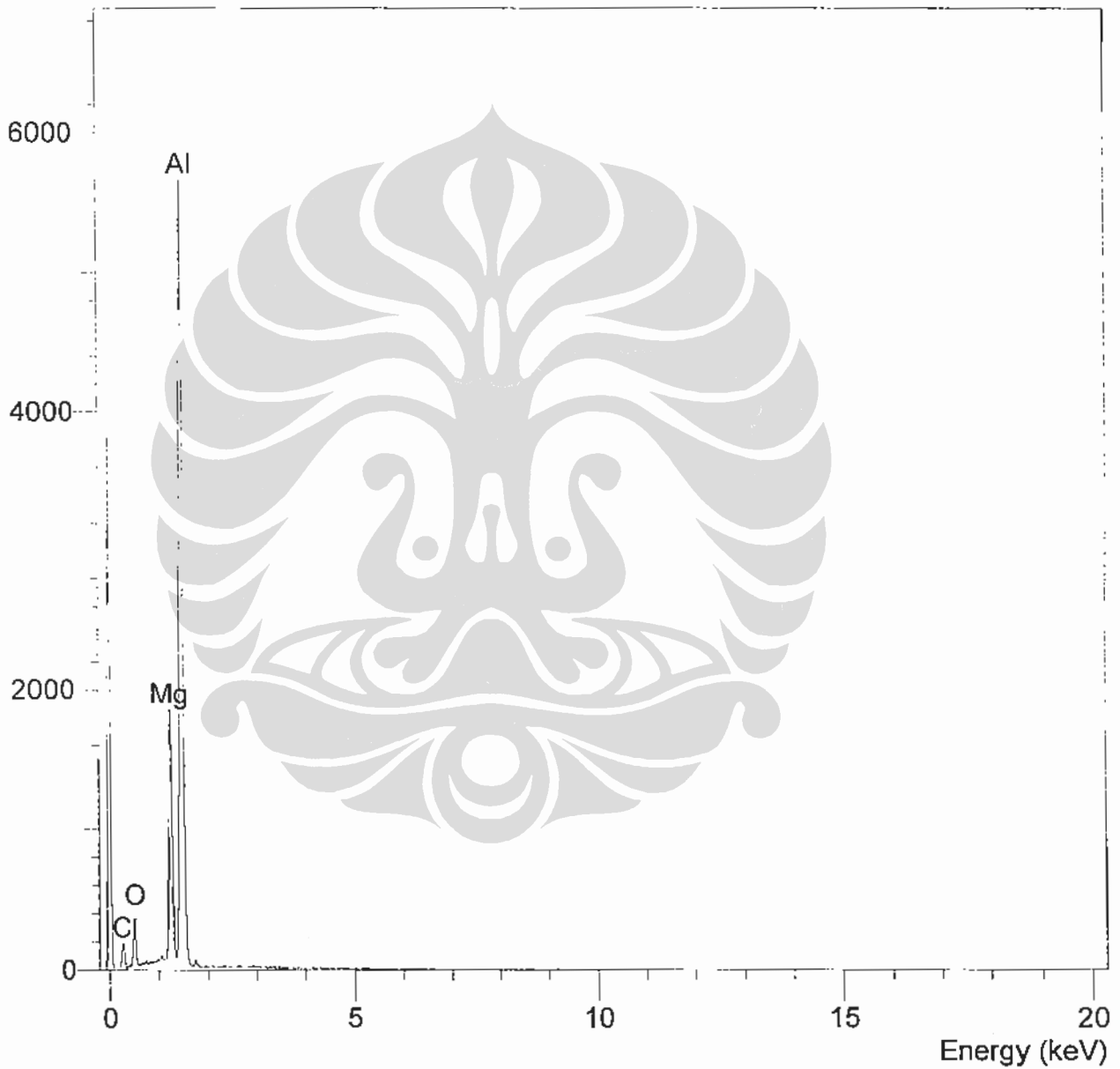


Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 3 - 02 (25/06/08 10:49)



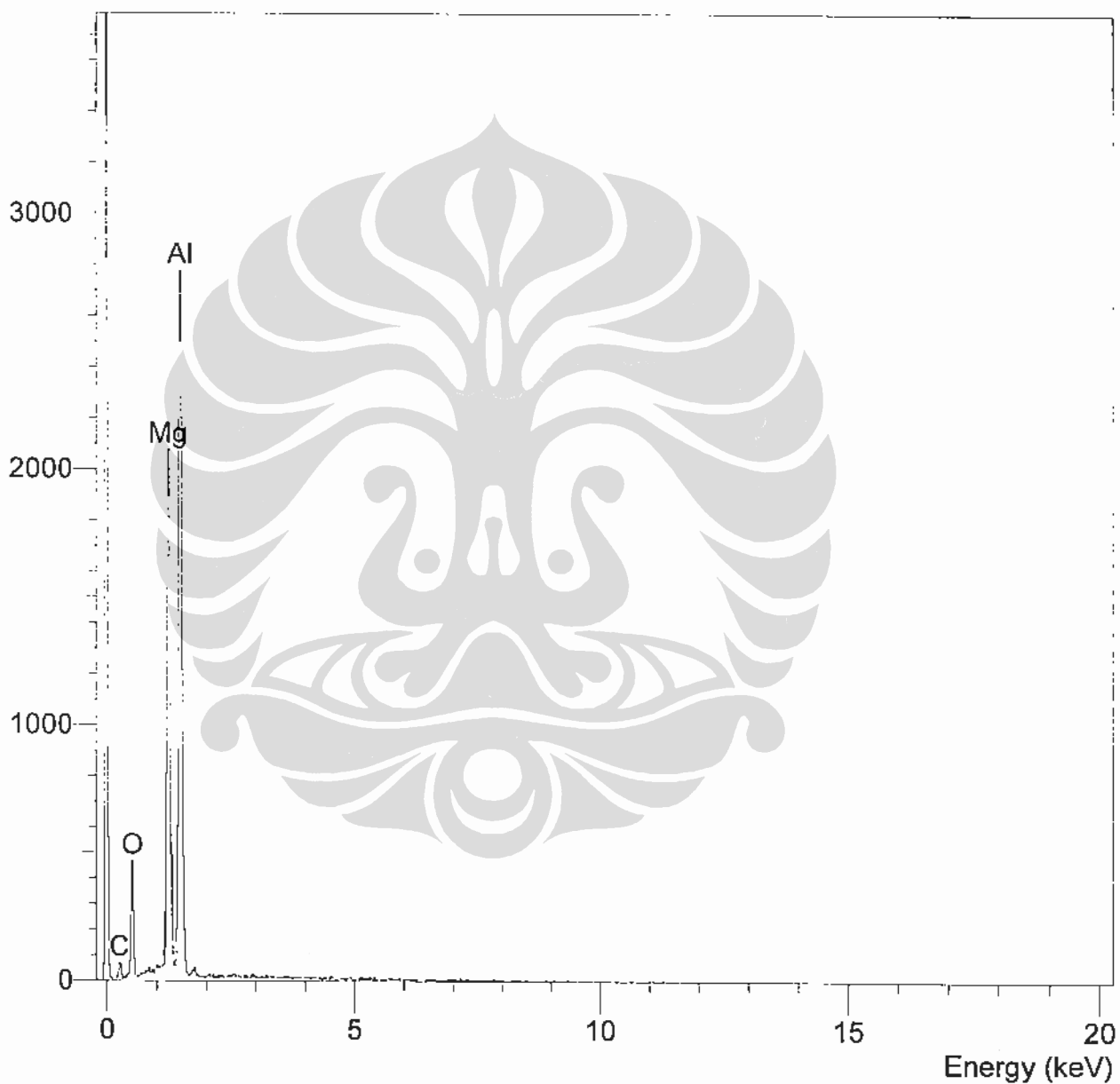
Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 3 - 03 (25/06/08 10:50)

Counts



Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 3 - 04 (25/06/08 10:51)

Counts



SEMQuant results. Listed at 13:04:30 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 3 - 01 10%

System resolution = 59 eV

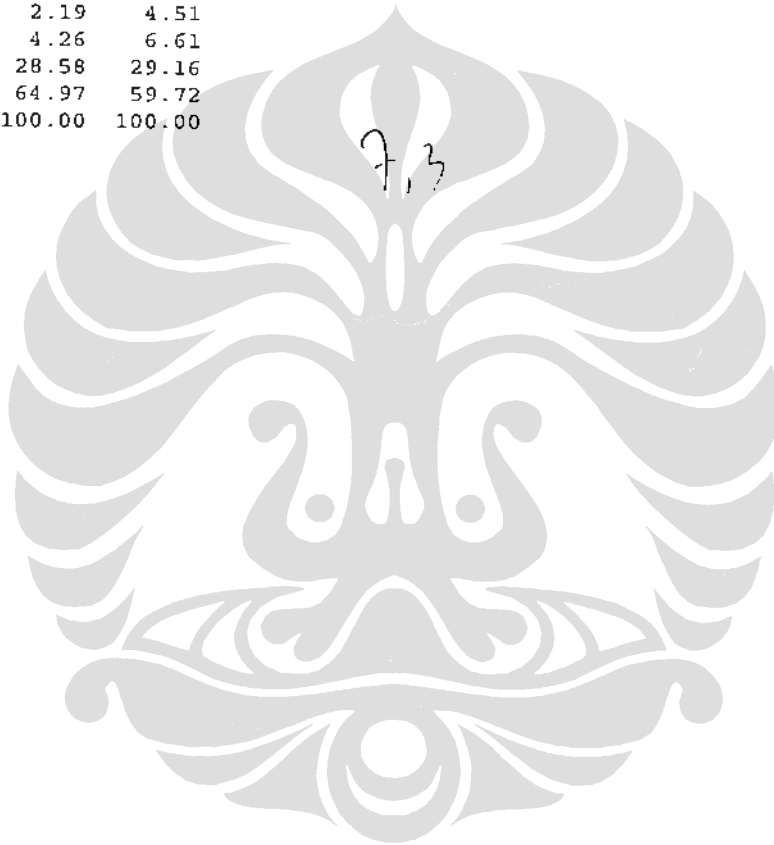
Quantitative method: ZAF (4 iterations).
Analysed all elements and normalised results.

Standards :

C K Carbon Low 13/09/06
O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. Type | Element % | Atomic % |
|-------|-------------|-----------|----------|
| C K | ED | 2.19 | 4.51 |
| O K | ED | 4.26 | 6.61 |
| Mg K | ED | 28.58 | 29.16 |
| Al K | ED | 64.97 | 59.72 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:04:54 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 3 - 02

System resolution = 59 eV

Quantitative method: ZAF (4 iterations).
Analysed all elements and normalised results.

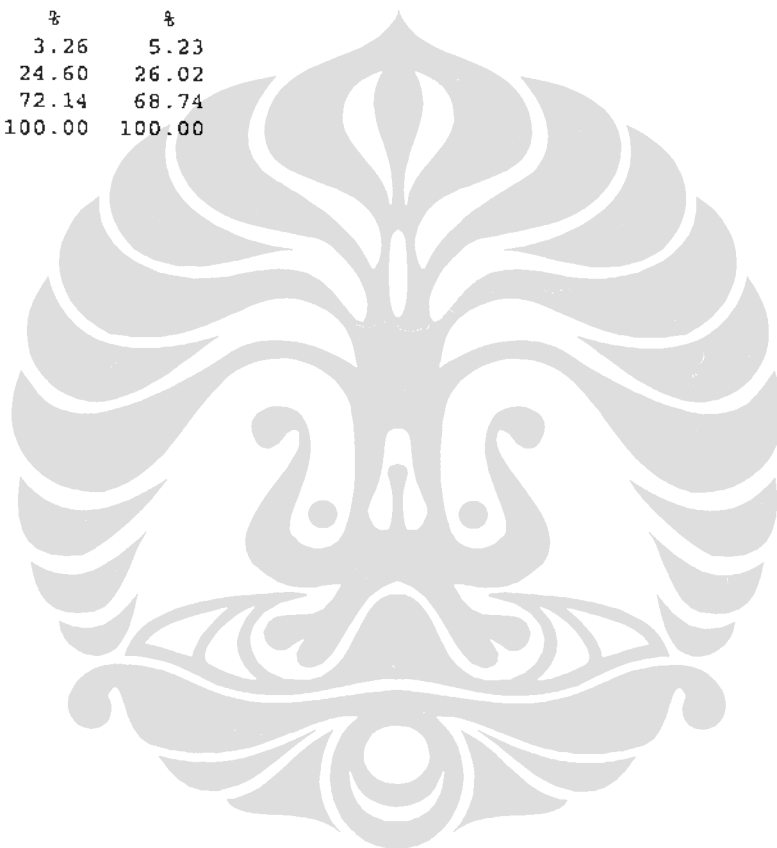
1 peak possibly omitted: 0.00 keV

Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. Type | Element % | Atomic % |
|-------|-------------|-----------|----------|
| O K | ED | 3.26 | 5.23 |
| Mg K | ED | 24.60 | 26.02 |
| Al K | ED | 72.14 | 68.74 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:05:12 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 3 - 03

System resolution = 59 eV

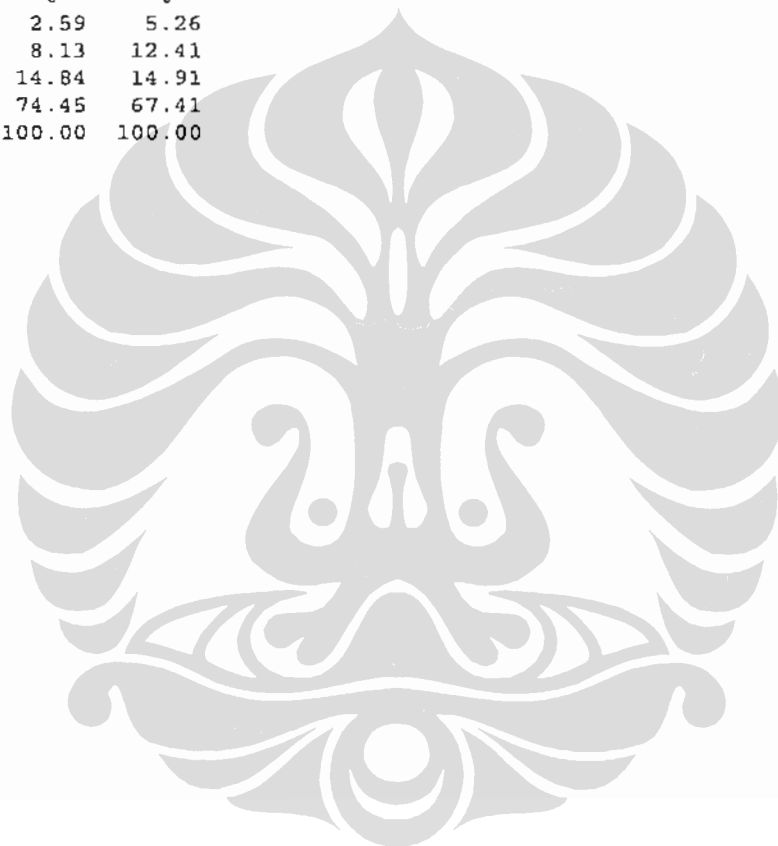
Quantitative method: ZAF (4 iterations).
Analysed all elements and normalised results.

Standards :

C K Carbon Low 13/09/06
O K AL203 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. | Element | Atomic |
|-------|--------|---------|--------|
| | Type | % | % |
| C K | ED | 2.59 | 5.26 |
| O K | ED | 8.13 | 12.41 |
| Mg K | ED | 14.84 | 14.91 |
| Al K | ED | 74.45 | 67.41 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:05:26 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 3 - 04

System resolution = 59 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

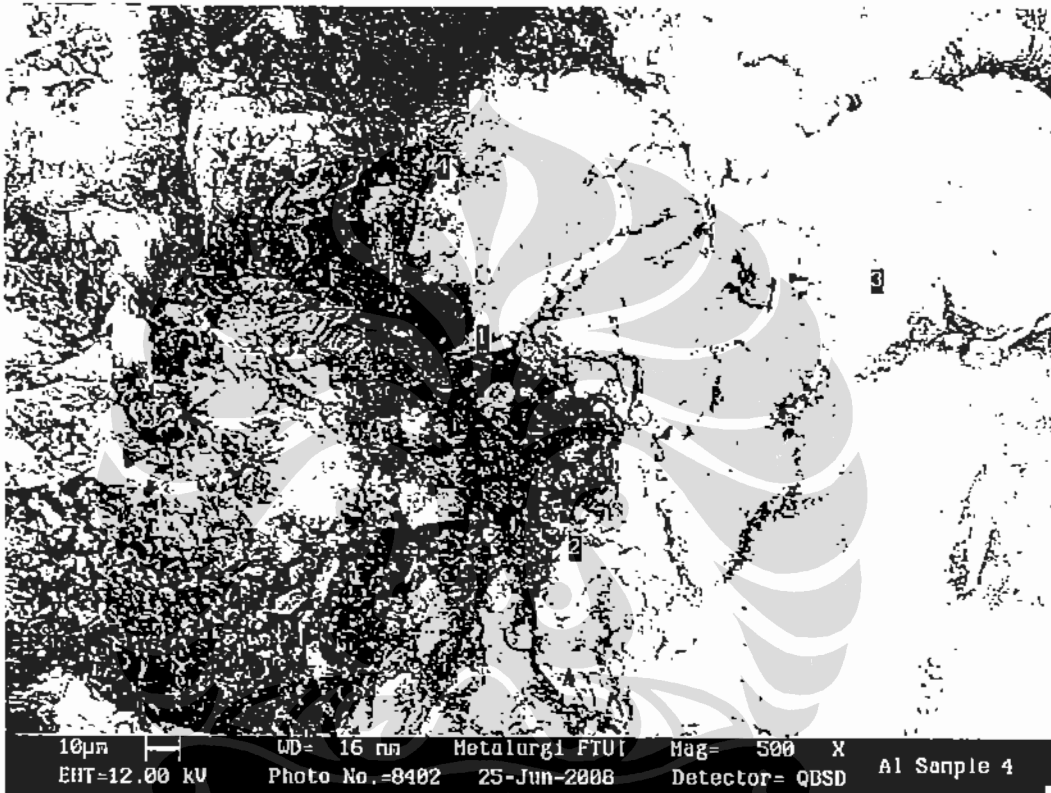
Standards :

C K Carbon Low 13/09/06
O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. | Element | Atomic |
|-------|--------|---------|--------|
| | Type | % | % |
| C K | ED | 1.25 | 2.45 |
| O K | ED | 14.38 | 21.24 |
| Mg K | ED | 25.29 | 24.57 |
| Al K | ED | 59.09 | 51.74 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma

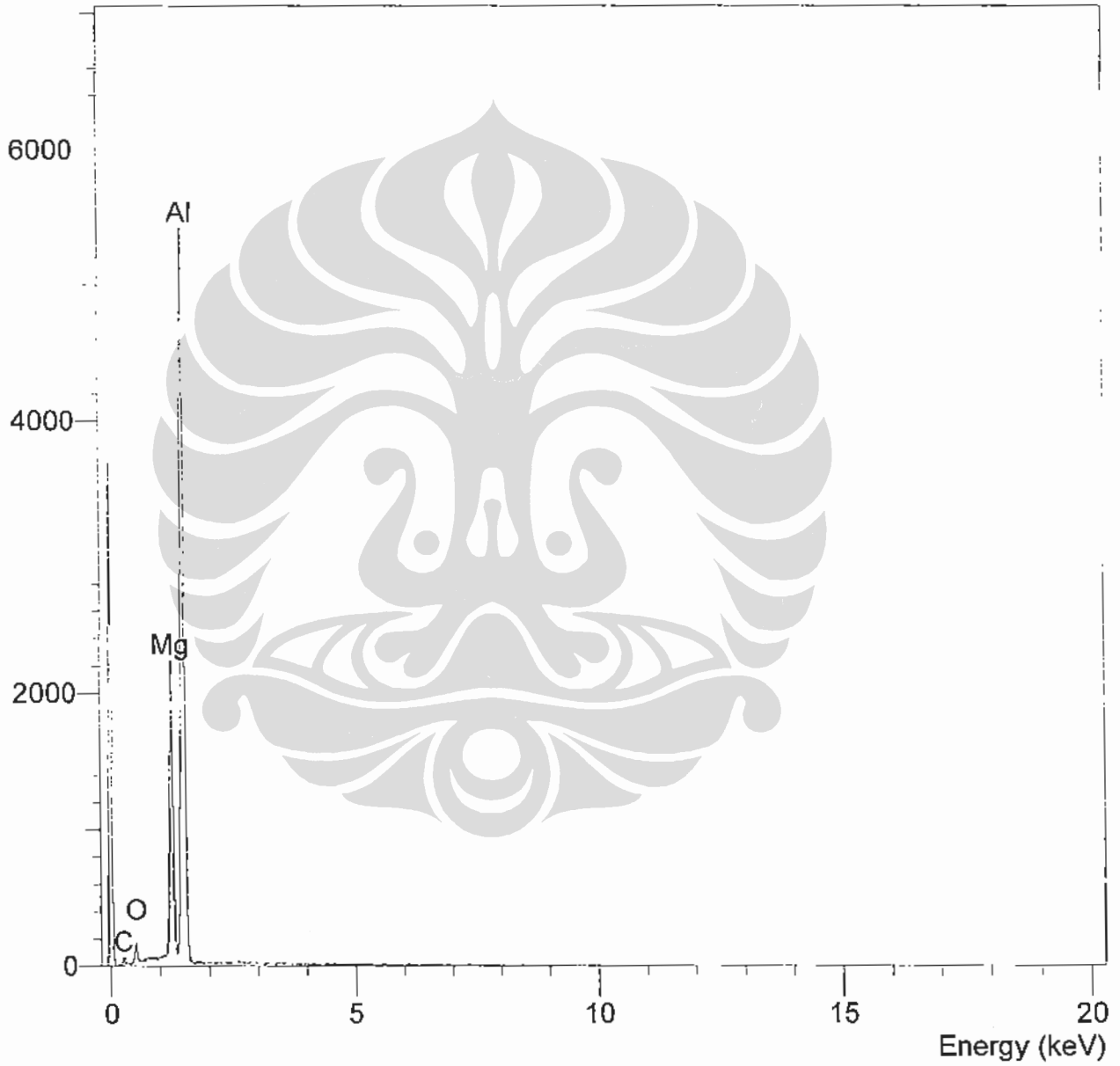




Hasil Pengujian SEM dengan Sampel A1-5

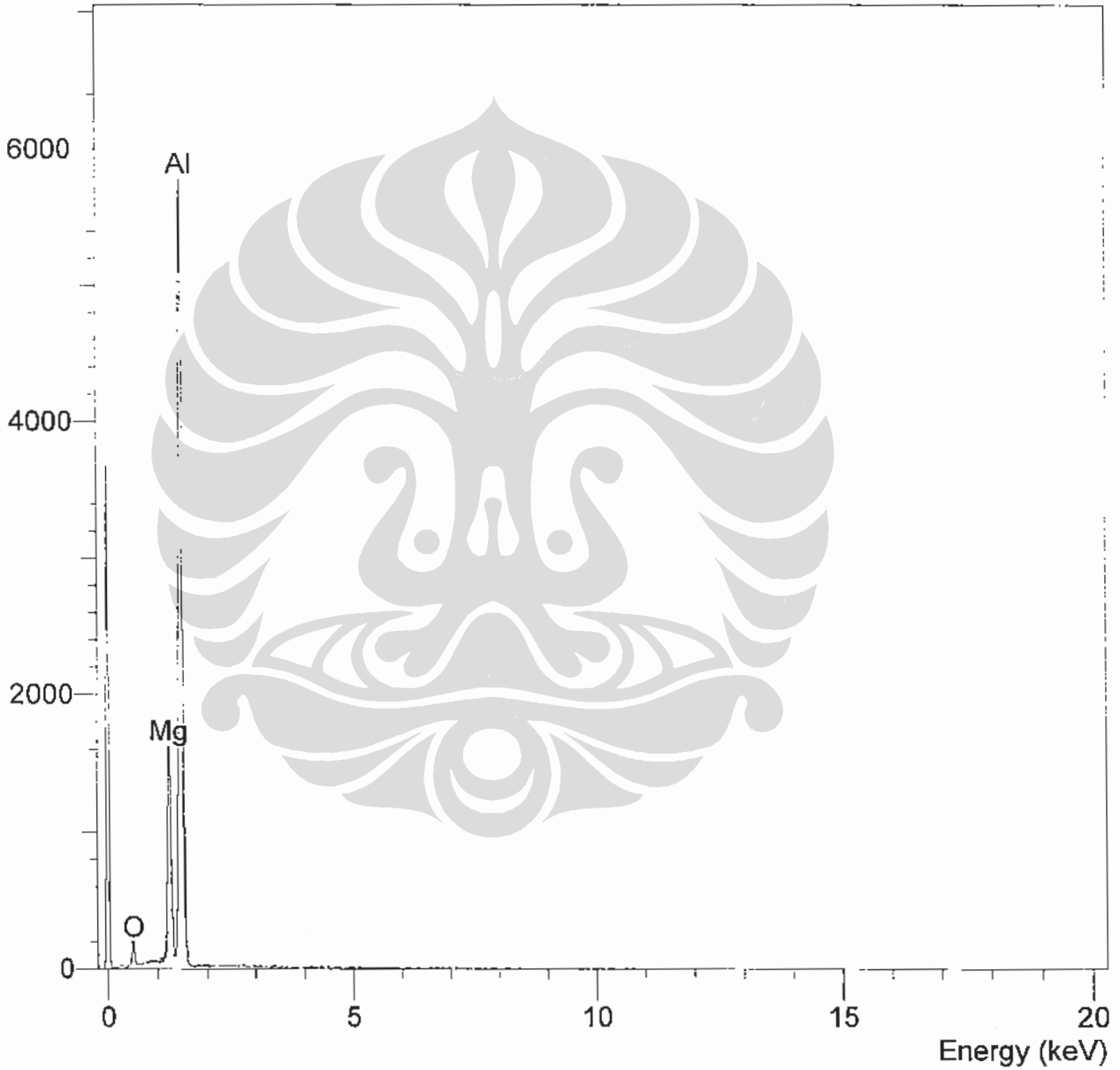
Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 4 - 01 (25/06/08 10:57)

Counts



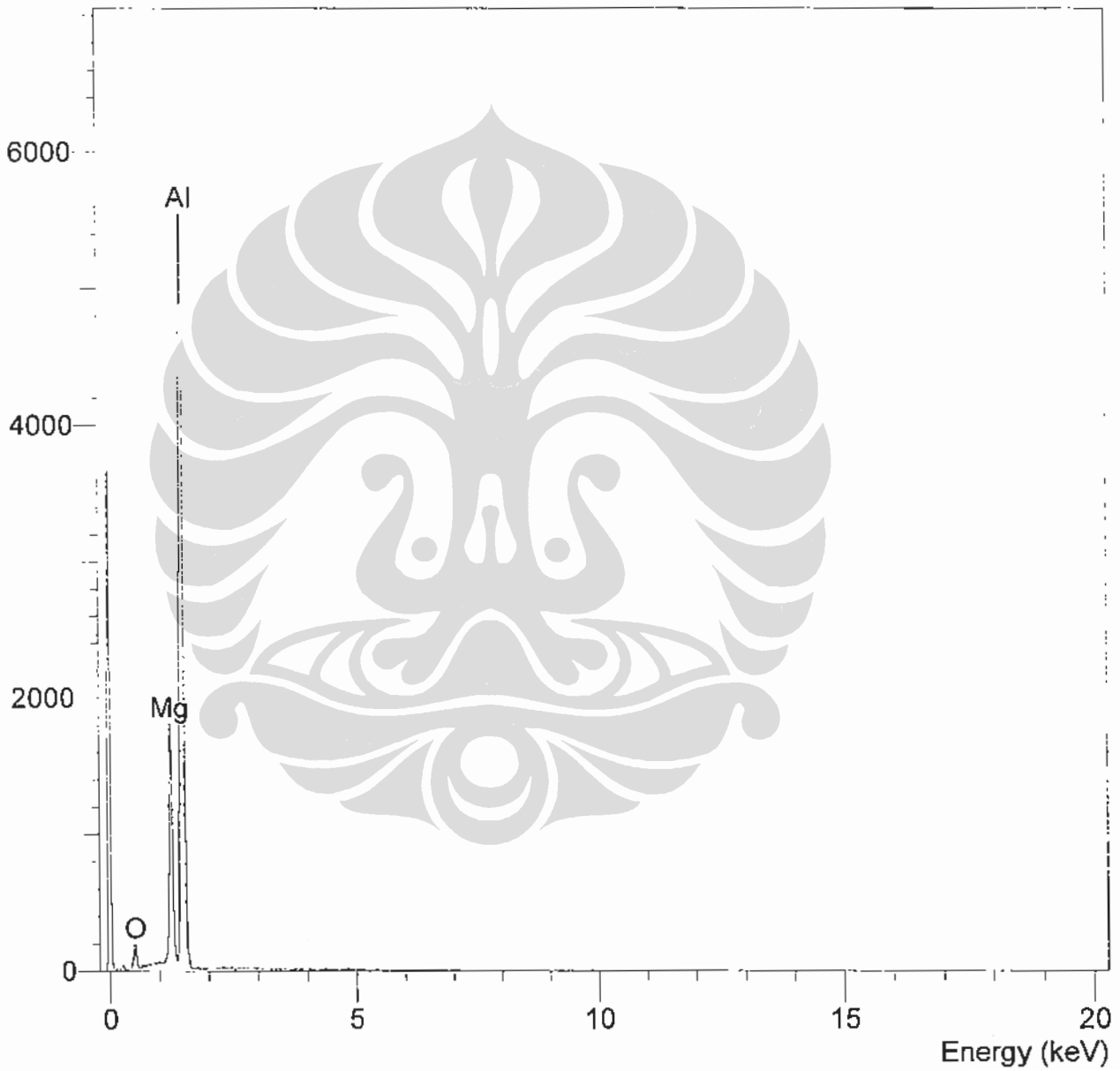
Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 4 - 02 (25/06/08 10:58)

Counts

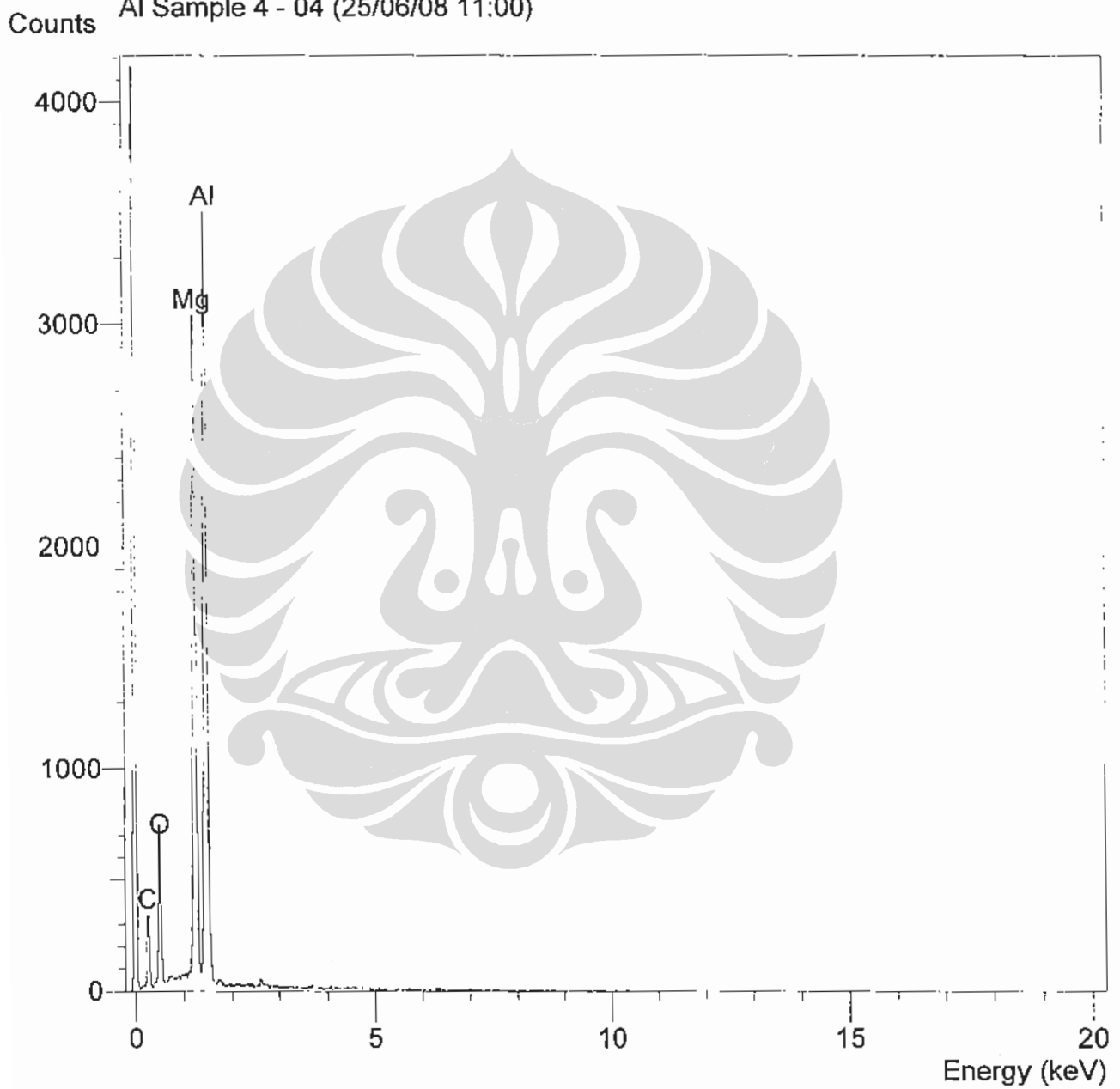


Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 4 - 03 (25/06/08 10:59)

Counts



Operator : jaya
Client : Dept. Metalurgi dan Material Universitas Indonesia
Job : Energy Dispersive X-Ray Analysis
Al Sample 4 - 04 (25/06/08 11:00)



SEMQuant results. Listed at 13:05:40 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 4 - 01 / *Eq%*

System resolution = 59 eV

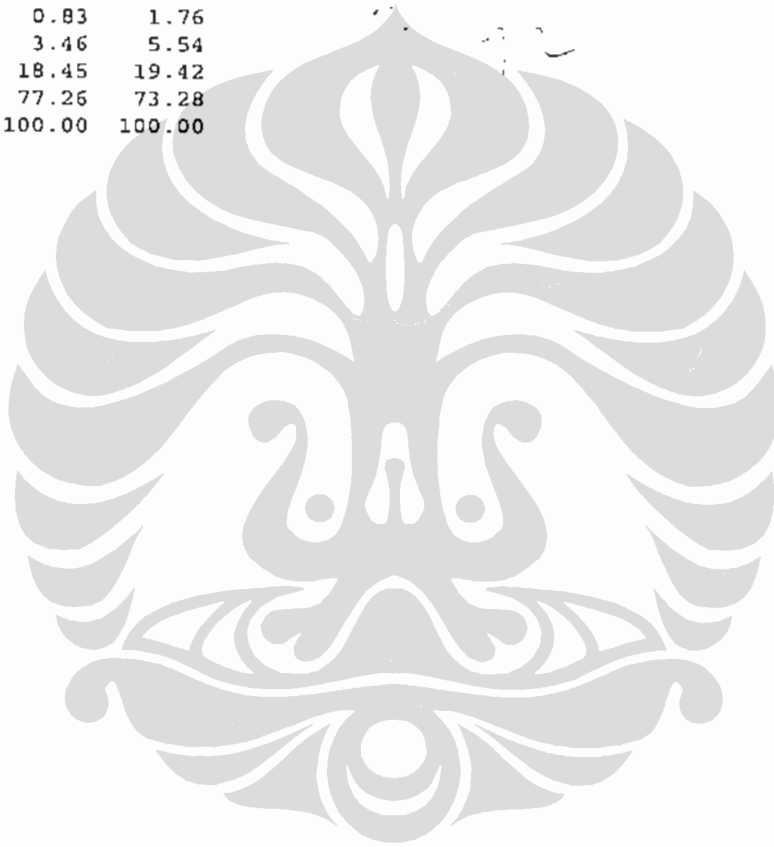
Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

Standards :

C K Carbon Low 13/09/06
O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. Type | Element % | Atomic % |
|-------|-------------|-----------|----------|
| C K | ED | 0.83 | 1.76 |
| O K | ED | 3.46 | 5.54 |
| Mg K | ED | 18.45 | 19.42 |
| Al K | ED | 77.26 | 73.28 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:05:58 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 4 - 02

System resolution = 59 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

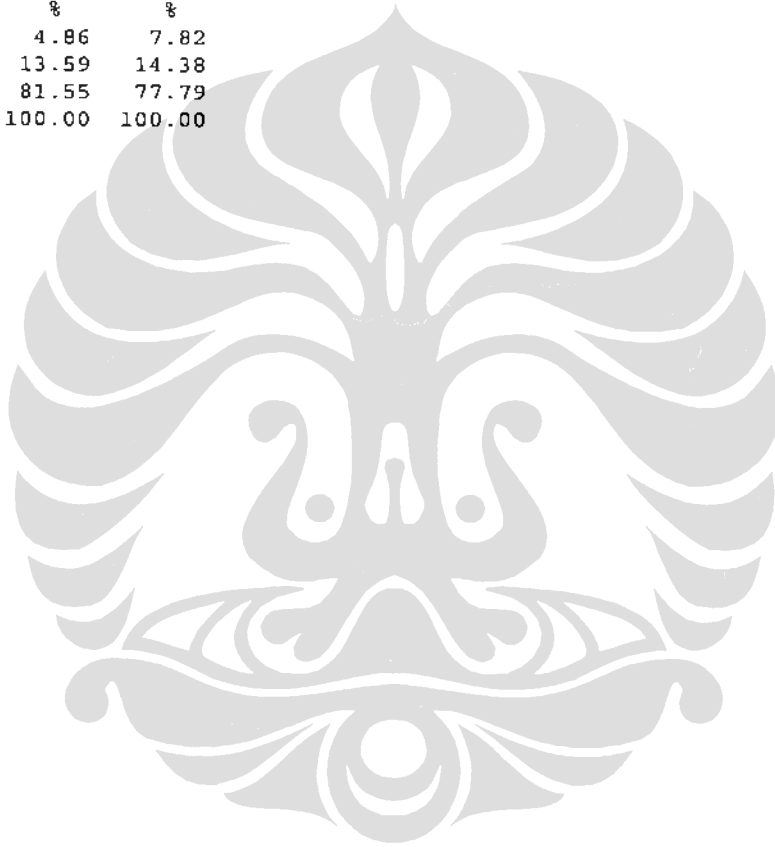
1 peak possibly omitted: 0.00 keV

Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. | Element | Atomic |
|-------|--------|---------|--------|
| | Type | % | % |
| O K | ED | 4.86 | 7.82 |
| Mg K | ED | 13.59 | 14.38 |
| Al K | ED | 81.55 | 77.79 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:06:10 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 4 - 03

System resolution = 59 eV

Quantitative method: ZAF (3 iterations).
Analysed all elements and normalised results.

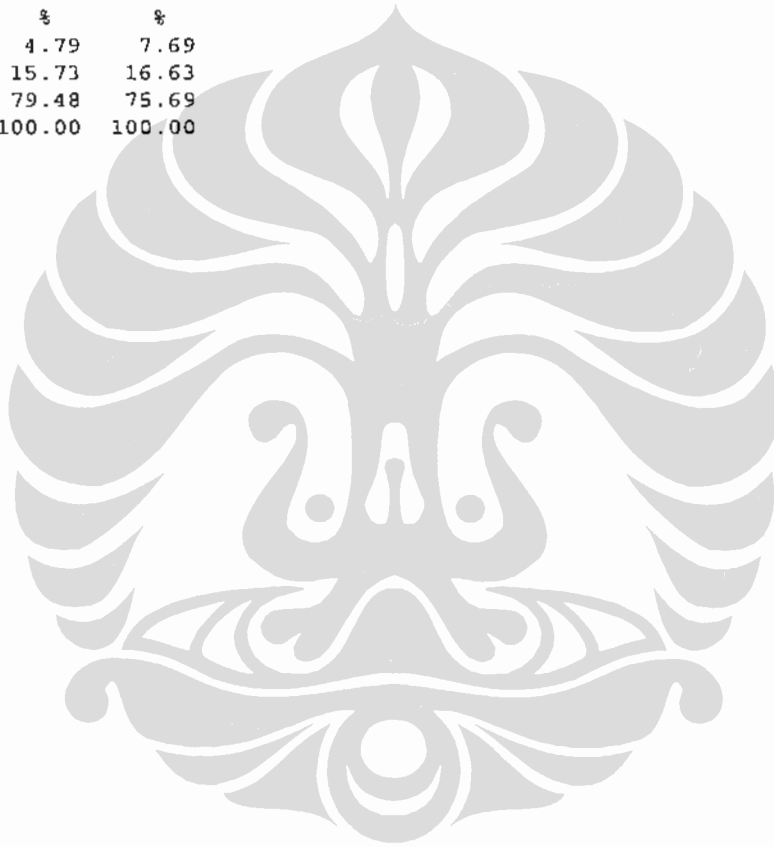
1 peak possibly omitted: 0.00 keV

Standards :

O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. | Element | Atomic |
|-------|--------|---------|--------|
| | Type | % | % |
| O K | ED | 4.79 | 7.69 |
| Mg K | ED | 15.73 | 16.63 |
| Al K | ED | 79.48 | 75.69 |
| Total | | 100.00 | 100.00 |

* = <2 Sigma



SEMQuant results. Listed at 13:06:28 on 25/06/08
Operator: jaya
Client: Dept. Metalurgi dan Material Universitas Indonesia
Job: Energy Dispersive X-Ray Analysis
Spectrum label: Al Sample 4 - 04

System resolution = 59 eV

Quantitative method: ZAF (4 iterations).
Analysed all elements and normalised results.

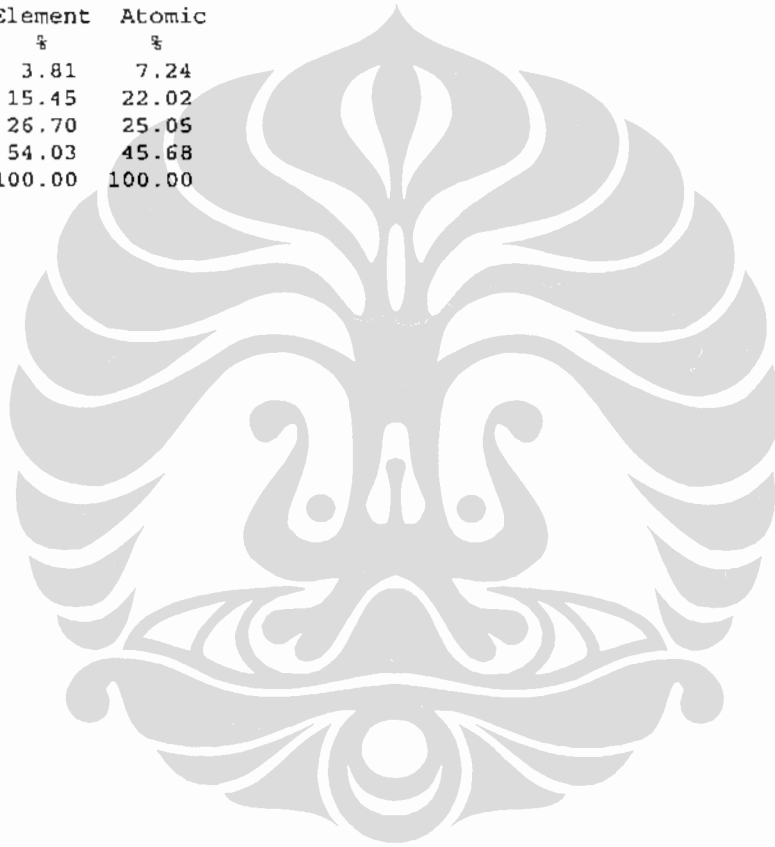
1 peak possibly omitted: 2.64 keV

Standards :

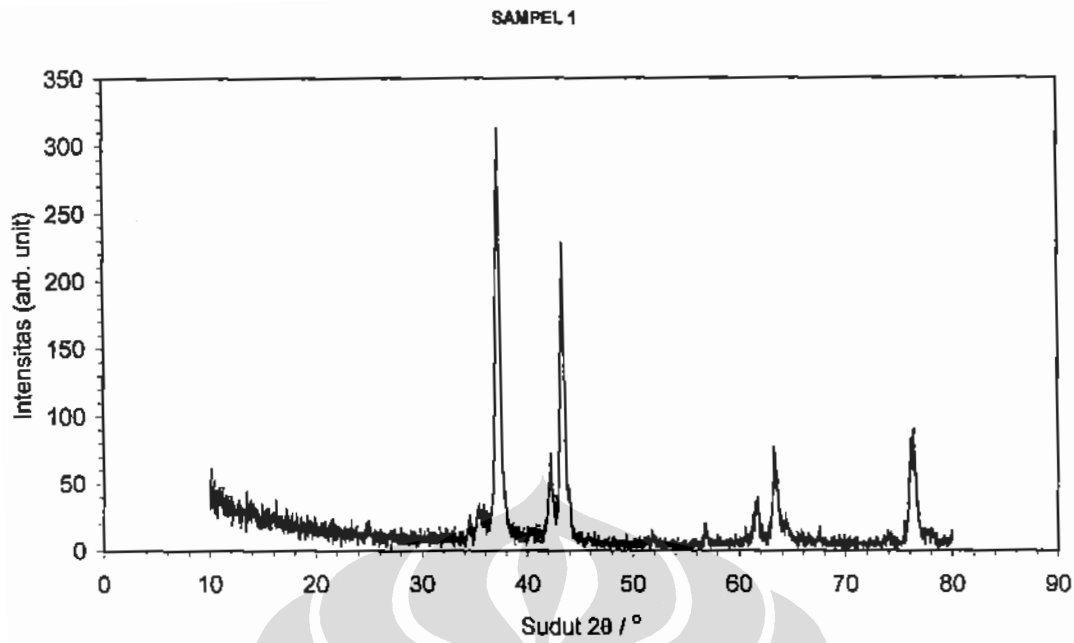
C K Carbon Low 13/09/06
O K AL2O3 22/03/06
Mg K MagOxide 22/03/06
Al K CeAl2 03/03/07

| Elmt | Spect. | Element | Atomic | Atomic |
|-------|--------|---------|--------|--------|
| | Type | % | % | % |
| C K | ED | 3.81 | 7.24 | |
| O K | ED | 15.45 | 22.02 | |
| Mg K | ED | 26.70 | 25.05 | |
| Al K | ED | 54.03 | 45.68 | |
| Total | | 100.00 | 100.00 | |

* = <2 Sigma

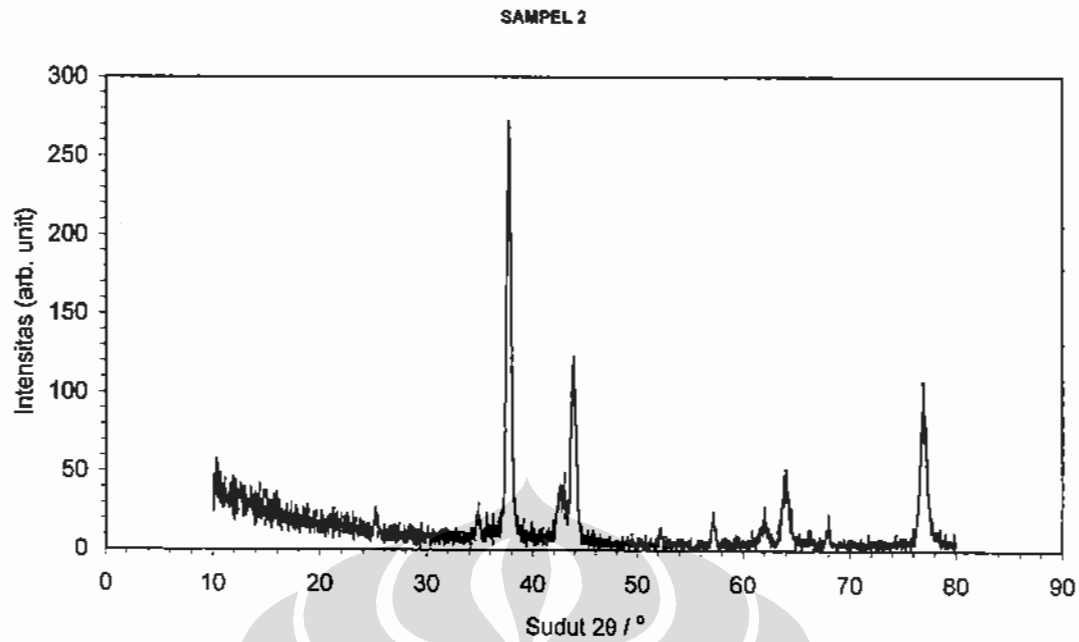






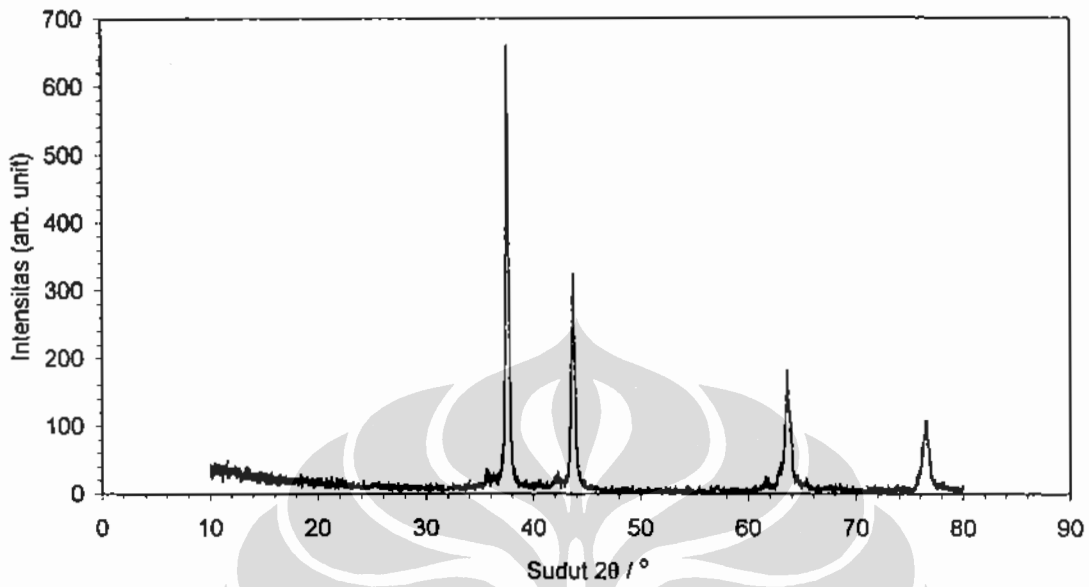
| 2θ | d |
|-----------|---------|
| 34,4432 | 2,60177 |
| 35,2795 | 2,54198 |
| 37,2366 | 2,41275 |
| 42,2026 | 2,13961 |
| 43,3573 | 2,08527 |
| 51,6574 | 1,76803 |
| 56,7768 | 1,62016 |
| 61,5697 | 1,50503 |
| 63,2771 | 1,46847 |
| 67,4666 | 1,38711 |
| 76,0287 | 1,25077 |
| 77,9727 | 1,22438 |

Gambar 1. Hasil XRD Busa Aluminium dengan Penambahan Fraksi Berat 20% Serbuk Alumina 5,77 μm



Gambar 2. Hasil XRD Busa Aluminium dengan Penambahan Fraksi Berat 15% Serbuk Alumina 5,77 μm

SAMPEL 4



| 2θ | d |
|-----------|---------|
| 35,6161 | 2,51872 |
| 37,5208 | 2,39512 |
| 42,0321 | 2,1479 |
| 43,6653 | 2,07127 |
| 57,1867 | 1,60952 |
| 61,7212 | 1,5017 |
| 63,5364 | 1,4631 |
| 76,3184 | 1,24674 |

Gambar 4. Hasil XRD Busa Aluminium dengan Penambahan Fraksi Berat 5% Serbuk Alumina 5,77 μm