Iggy Tan, Managing Director, Altech Chemicals Limited

High Purity Alumina – Use in Non-Metallurgical Applications
To be a world leading producer of high purity alumina (HPA)
Sapphire & Ruby
Natural form of high purity alumina (HPA)
Formed by mother nature like diamonds
Colour from impurities
Nearly as hard as diamond
• Purified alumina ($\text{Al}_2\text{O}_3$)
• Greater than 99.99% (4N) purity
• Max impurities of 100ppm
• Smelter Grade Alumina (SGA) ~ 99.5% (5,000 ppm impurities mainly sodium)
• Bayer Process uses sodium hydroxide (NaOH)
• Sodium impurity is problem for electronics industry

What is HPA?

SGA – Smelter Grade Alumina
Sapphire Glass Production
**Smelter Grade Alumina (SGA)**
- 99.5%
- $400 per t

**High Purity Alumina (HPA)**
- 99.9% (3N)
- $6,000 per t
- 99.99% (4N)
- $23,000 per t
- 99.999% (5N)
- $50,000 per t

**Our Target Business**
- HPA substrate for LEDs

**High Price for Purity**
Welcome to the World of HPA

- Electronic Substrates
- Hybrid Cars
- Sodium Lamps
- Medical
- Optical Lenses
- LED Lighting
- Display Screens
- Abrasives
- Ceramic Tools
- HP Refractory
- Separation Membranes
- Ultrafiltration
- Special Ceramics
- Cosmetics
- Abrasive Polishing
- Industrial Special Ceramics
- HP Refractory Abrasives
- Ultrafiltration
- Semiconductors
- Headlights
- Optical Lenses
- Military Aerospace
High Purity Alumina Applications

- LEDs
- Semiconductors
- Phosphor Based Applications
- Other Applications

Smartphone sapphire glass is a new market

Light Emitting Diodes (LEDs)
Technavio Research

• Global HPA demand 19,040tpa in 2014
• Expected to increase to 48,230tpa by 2018
• Growing at a CAGR of 28%
Global shipments of LED lamps forecast to increase from 864 m in 2015 to 4.1 billion by 2024 - Navigant Research

Source: 'LED Lighting: Global Outlook'

Demand for HPA

High end Vertu TI with sapphire crystal screen
Rest will follow

Huawei beats Apple to sapphire glass smartphone
By Reuters Staff on Sep 7, 2014 10:11 PM
Filed under Mobility

High-spec features for limited-edition Aspire.
Huawei Technologies has unveiled a slate of new devices meant to showcase the Chinese company's hardware technology, just days before Apple releases its highly anticipated iPhone 6 on 9 September.

Huawei, which began as a telecom equipment company in 1987, has rapidly
apple watch & iphone 7
• Estimate 30g¹ of HPA in phone screen
• 500 million smartphones sold per year
• If all sapphire glass technology
  o Extra 15,000tpa of HPA
  o 4 x our proposed 4,000tpa plant
• There will be a HPA supply deficit

¹ Altech Estimates
Sapphire Glass Scratch Test

Stone wall
New Foxconn plant reported to make sapphire displays for iPhones


Taipei, Nov. 25 (CNA) Taiwan's Foxconn Technology Group, a major supplier of Apple Inc.'s iPhones and iPads, has decided to build a new factory in China to produce sapphire displays for next-generation iPhones, according to a Chinese media report.
• 70% of HPA demand - Asia Pacific region (APEC)
• Region for the world’s manufacturing
• Altech’s HPA plant (Malaysia) well-positioned to service APEC region
• Transport, customer service, technical credibility
Six largest HPA producers

- 3 Chinese, 1 Japanese, 1 South African, 1 French
Altech’s Differentiation

Bauxite → Alumina Refinery → Smelter Grade Alumina 99.8% → Alumina Smelter → Aluminium Metal → Aluminium Dissolution → 99.99% HPA

ALTECH HPA PLANT

One Single Process Step

Current HPA Producers

US$2,000 per tonne

Altech’s Differentiation

Bauxite

Smelter Grade Alumina 99.8%

Aluminium Metal

Aluminous Clay

99.99% HPA

99.99% HPA
• Processed by mother nature
• Very low Iron (Fe) due to weathering
• Silica is non reactive – easily removed

<table>
<thead>
<tr>
<th></th>
<th>Bauxite Darling Range *</th>
<th>Canadian HPA Project</th>
<th>Altech HPA Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \text{Al}_2\text{O}_3 ) (%)</td>
<td>34.5</td>
<td>22.77</td>
<td>30.5</td>
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<tr>
<td>( \text{SiO}_2 ) (%)</td>
<td>21.5</td>
<td>53.29</td>
<td>56.3</td>
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<tr>
<td>( \text{Fe}_2\text{O}_3 ) (%)</td>
<td>21.2</td>
<td>8.36</td>
<td>0.7</td>
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<tr>
<td>( \text{TiO}_2 ) (%)</td>
<td>2.00</td>
<td>0.98</td>
<td>0.7</td>
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<tr>
<td>( \text{K}_2\text{O} ) (%)</td>
<td>0.24</td>
<td>3.41</td>
<td>0.1</td>
</tr>
<tr>
<td>( \text{NaO} ) (%)</td>
<td>0.005</td>
<td>1.42</td>
<td>0.1</td>
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</table>
• Altech owns 100% of deposit in W Aust
• Low environmental impact
• Previously mined for kaolin – trial pit
• Low stripping ratio
• 65Mt JORC Resource
• 130kms from Fremantle Port
Altech’s HPA Process

- Use a standard HCl leach process
- Developed in 1980’s by alumina industry
- Couldn’t compete with Bayer SGA costs
- But great at producing HPA (no sodium ions)
- However little demand of HPA in 1980s
- Demand of HPA is here today
New HPA Demand + Established Process + Great Deposit + Experienced People
→ Shareholder Value

“the last piece of the puzzle is in place”
• Started work in early 2011
• Many studies and testwork programs
• No issues about producing 99.99% HPA
• Supporting lab pilot plant test work
• Off the shelf plant and equipment
• Bankable Feasibility Study completed
Meckering Plant

- Oversize Disposal
- Drum Scrubber
- Screening
- Filtration
- Dryer
- ROM Feed
- Dryer Baghouse
- Filtration
Meckering Plant
Beneficiated Kaolin Shipping
- Tanjung Langsat Industrial Park, Johor Bahru (Malaysia)
- Kaolin feedstock shipped from WA
- Operating costs ~40% lower than Australia
- Capital costs expected to be 50-60% lower
Malaysian HPA Operation

- Hydrochloric acid, lime, power & natural gas
- International container sea-port & Singapore
- Investment incentives
Malaysian HPA Operation
Malaysia HPA Plant
Highly Attractive BFS

- Capital cost estimate US$76.9 m
- Payback period 3.8 years
- Pre-tax NPV\textsubscript{10} of US$326 m
- Highly attractive IRR of 30.3%
- Operating cost of US$8,200/t
- Margin of US$14,800/t
- Operating profit of US$59.4 m pa

- Breakaway values ATC 31c p share
“It is not often that you see the NPV (US$ 326m) of a project, 4 times the multiple of the capital cost estimate (US$77m)”  Iggy Tan MD
• Breakway - competitors US$14-17,000 /t
• Bottom quartile for operating costs
  1. We own our feedstock
  2. Large scale economy 4,000 tpa – one train
  3. Main reactant HCl re-used
  4. Minimal impurity removal costs
  5. Plant in low cost country (Malaysia)
• Commenced discussions with Asian banks
• Targeting around $55 m project debt
• Structured project finance options
• Europe based bonds
• Product off take phase
• MIDA tax incentives
• Detailed engineering & permitting
Our Potential Customers
“HPA will be part of the next “new age materials boom” like rare earths, lithium and graphene”  Iggy Tan
Thank you

Right Place
Right Time
Right Feedstock
Right Technology
Forward-looking Statements
This announcement contains forward-looking statements which are identified by words such as ‘anticipates’, ‘forecasts’, ‘may’, ‘will’, ‘could’, ‘believes’, ‘estimates’, ‘targets’, ‘expects’, ‘plan’ or ‘intends’ and other similar words that involve risks and uncertainties. Indications of, and guidelines or outlook on, future earnings, distributions or financial position or performance and targets, estimates and assumptions in respect of production, prices, operating costs, results, capital expenditures, reserves and resources are also forward looking statements. These statements are based on an assessment of present economic and operating conditions, and on a number of assumptions and estimates regarding future events and actions that, while considered reasonable as at the date of this announcement and are expected to take place, are inherently subject to significant technical, business, economic, competitive, political and social uncertainties and contingencies. Such forward-looking statements are not guarantees of future performance and involve known and unknown risks, uncertainties, assumptions and other important factors, many of which are beyond the control of our Company, the Directors and management. We cannot and do not give any assurance that the results, performance or achievements expressed or implied by the forward-looking statements contained in this announcement will actually occur and readers are cautioned not to place undue reliance on these forward-looking statements. These forward looking statements are subject to various risk factors that could cause actual events or results to differ materially from the events or results estimated, expressed or anticipated in these statements.

Competent Person Statement
Technical information in this report is based on information compiled by Mr Michael O’Mara, B.Sc. Geology, Altech Chief Geologist and a member of the Australasian Institute of Geoscientists. Mr O’Mara has sufficient exploration experience which is relevant to the styles of mineralisation and types of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2012 Edition of the ‘Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves’ (“JORC 2004”). Mr O’Mara consents to the inclusion in this release of the matters based on his information in the form and context in which it appears.