# Prosonix Ltd

### **Ultrasonic Particle Engineering**

John Burns PIN Meeting November 21<sup>st</sup> 2007



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## Prosonix Ltd

- World leaders in the use of ultrasound in commercial scale process chemistry
- Global customer base in pharmaceuticals, chemicals, minerals, energy
- Based in Oxford UK the Prosonix Team consists of
  PhD Chemists, Chemical and Mechanical Engineers, Experienced BD professionals
- Technology platform includes
  - Award Winning CrystalGEM<sup>TM</sup> predictive crystallization
  - Prosonitron<sup>TM</sup> reactors for sonocrystallization, sonoprocessing, & sonochemistry
  - SAX<sup>TM</sup> Particle Engineering Technology for advanced pharmaceuticals
- Key technology partnerships with world renowned experts
  - Dr John Perkins and Sonic Systems
  - Dr George Tranter and Chiralabs
  - Dr Rob Price and University of Bath
  - Professor Tim Mason, University of Coventry
  - Professor Kevin Roberts, University of Leeds
  - Scientific Update, Royal Society of Chemistry, National Physics Laboratory
- Key license deals with UCB Pharma, Aughinish (Glencore), Alcoa World Alumina



## **Business Overview**

#### Current Core Business

CrystalGEM<sup>™</sup>

Prosonitron™

#### **Developing Business**

SAXTM

Award Winning Predictive Crystallization Fee for Service SonoLab<sup>™</sup> Collaborative R&D Services Licensing of process technology Equipment Supply Product Supply via Partner Collaborative research and development agreements & Licensing of technology Product Supply



### What is Sonoprocessing?





Ultrasound causes a pressure wave in solution Cavitation caused by successive compression and rarefaction

**Ultrasonic Mediated Cavitation Facilitates** 

- Nucleation and Crystallization Control
- Intense Mixing
- Solid/Liquid interactions
- Liquid/Liquid Interactions
- Process Intensification



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## **Historic Engineering Limitations**

Cavitational erosion has previously prohibited commercial use

Liquid jet penetrates bubble during asymmetric collapse

Damage to a solid caused by jet impact and emission of shock waves as a result of repetitive bubble implosions





30 hrs of non-continuous use



- Probes have not been used for commercial scale production
- Prosonix has overcome these engineering limitations



## **Cavitation Control**

Prosonitron<sup>™</sup> design focuses power towards the central flow-

- Ultrasound generated at the transducers passes through the metal masses to enter the liquid at the tube walls.
- The sound waves propagate and focus power at the centre of the flow adjacent to the bonded front mass.





Cavitation Mapping Using NPL probe



### Prosonix Prosonitron<sup>TM</sup> Success Stories

3 major customer license deals secured



#### UCB Pharma (Major Pharma)

- First demonstration of Prosonitron<sup>TM</sup> at pharma pilot scale
- License Agreement and broad collaboration deal
- Sonocrystallization control of shape, size and polymorph

#### Aughinish Alumina (Glencore)

- Worlds first continuous large scale Sonocrystallizer
- 2 years continuous operation in aggressive conditions
- · Aids key impurity removal, increasing plant efficiency and capacity

#### Alcoa World Alumina (# 1 in Global Alumina)

- · Second continuous Sonocrystallizer to worlds biggest alumina player
- Analogous application to AAL, potential at 8 other Alcoa refineries







#### Prosonix Ltd Experts in Sound Science

# For more information on the whole range of Prosonix products and services please visit

### www.prosonix.co.uk



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