



# Advanced Spectroscopic Technologies

Missouri Technology Expo

**October 7, 2010**



The Art of Living Building  
1141 South 7<sup>th</sup> Street  
St. Louis, MO 63104  
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# Agenda

- Corporate Overview
- Technology
- Developments
- The Opportunity



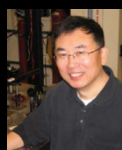
# Corporate Overview - *Our Mission*

**Advanced Spectroscopic Technologies is focused on enhancing the instrumentation sensitivity of optical spectrophotometers by increasing their signal-to-noise ratio, thus allowing for measurements of substances at lower concentrations than ever before possible.....**

# Corporate Overview - *Our Team*

## Zhi Xu, Ph.D.

Professor, Inventor  
Department of Chemistry & Biochemistry  
University of Missouri, St. Louis



## David W. Larsen, Ph.D.

Professor Emeritus  
Department of Chemistry & Biochemistry  
University of Missouri, St. Louis



## Advanced Spectroscopic Technologies

## Wayne Garver

Research Scientist  
Department of Physics  
University of Missouri, St. Louis



## The Incubation Factory

A "Commercialization Agent" for leading  
Tech Transfer Organizations, National  
Labs & Research Institutions



# Corporate Overview -

## *Putting the Deal Together...*

- Collaboration between University of Missouri – St. Louis & The Incubation Factory
- The Incubation Factory specializes in taking technologies across the “**Valley of Death**” – *from Validated Technology to Commercialized Success*
- Implement Unprecedented Core Strategies specific to tech-transfer using Inc. 500 techniques which become the “**Assembly Line**” of our Factory

# Technology - *Value Proposition*

- Our patented technology provides greatly enhanced sensitivity which allows for testing on samples of much lower concentration, thus bringing spectrophotometry into new markets not possible with current instrumentation
- Accomplished through our “***Optical Adapter***” enhancement
  - Easily retrofit into current devices
  - Incorporated into newly manufactured devices
- AST is a company focused on Fourier Transfer Infrared technologies, leveraging existing sales and distribution channels of top instrument manufacturers as well as a direct sales force

# Technology - *Optical Adapter for FTIR*

- FTIR (Fourier transform-infrared) spectroscopy has progressed considerably over the past two decades
- Compares favourably to Mass Spectrometers...
- Trend towards miniaturization, handheld devices and non-invasive/non-destructive monitoring



# Technology

## *Fourier Transfer Infrared Spectrophotometer*

### Advantages of FTIR Technology

- Broad band detection of all wavelengths simultaneously
- High speed detection of entire spectrum within seconds
- High wavelength accuracy
- High resolution
- High optical power throughput





# Technology -

## *Fourier Transfer Infrared Spectrophotometer*

### Challenges of FTIR

Low dynamic range

Digitization noise for small signal

Interference from large background absorption

Light source noise

Moving mirror noise

### Benefits Achieved with *AST Optical Adapter*

Increases dynamic range over 100-fold

Amplifies small signal over 100-fold

Reduces interference due to optical absorption of components other than sample

Reduces source noise up to 100-fold

No modification on optical and electronic architecture of the FTIR spectrophotometer

# Technology - *Applications*

- Inline Detection & Monitoring of Production Processes & Reactions
- Analyzing Chemical & Biological Samples
- Identifying levels of nutritional components
- Identifying levels of foreign materials
- Identifying levels of raw materials
- Verifying levels of raw materials
- Verifying purity
- Conducting Medical & Academic Research
- Performing Trace Analysis
- Emerging applications;
  - Biological
  - Cancer Imaging Modality
  - Explosives Identification

## Industries

- Air, Water and Soil Quality
- Materials
- Food/Agricultural Products
- Crude Oil
- Films & Plastics
- Semiconductors
- Manufactured Consumer Products
- Colorimetry
- Pharmaceuticals, and more



# Developments

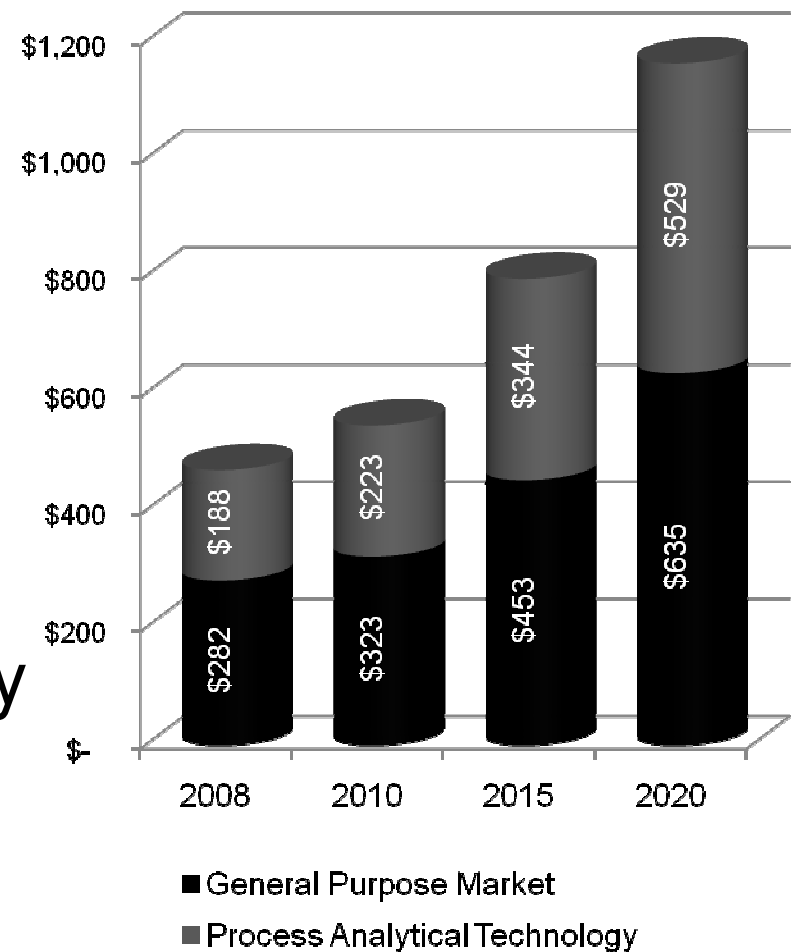
- Licensing Finalized
- Testing and Validation
- Extension of Patent Portfolio
- Prototype Validation
- Finalize Advisory Board
- Product Rollout
- Production Manufacturing
- Commence Targeted Business Development

# The Opportunity

- **Market**
  - Expanding applications and markets
  - CAGR anticipated to be in low double digits
- **General Purpose Market**
  - Rapid growth projected worldwide
  - Demand projected to increase
- **Process Analytical Technology Market**
  - Worldwide market for PAT was \$200M in 2009
  - Expected to continue to experience growth

## Global FTIR Market

*LabTechnologist*



# The Opportunity - *Target Addressable Market*

<b>General Purpose FTIR</b>			<b>Process Analytical Technology</b>		
<i>5% of Market</i>			<i>5% of Market</i>		
<b>New Unit Sales</b>			<b>New Unit Sales</b>		
Annual Sales	8,000	400	Annual Sales	2,000	100
Unit Price		\$10,000	Unit Price		\$25,000
<b>Projected Revenues</b>		<b>\$4 million</b>	<b>Projected Revenues</b>		<b>\$2.5 million</b>
<b>Retrofits</b>			<b>Retrofits</b>		
Existing Units	100,000	5000	Existing Units	40,000	2000
Unit Price		\$10,000	Unit Price		\$25,000
<b>Projected Revenues</b>		<b>\$50 million</b>	<b>Projected Revenues</b>		<b>\$50 million</b>



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Thank You

