

# Research Frontiers Incorporated

## SPD-Smart<sup>®</sup> Light-Control Film Technology



Note: From time to time Research Frontiers may issue forward looking statements which involve risks and uncertainties. This presentation contains forward looking statements, including estimates and predictions, within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. Actual results could differ and are not guaranteed. Any forward looking statements should be considered accordingly.

# Presentation Outline

- I. Company Overview
- II. SPD-Smart™ Light-Control Film Technology
- III. Markets
- IV. The Opportunity

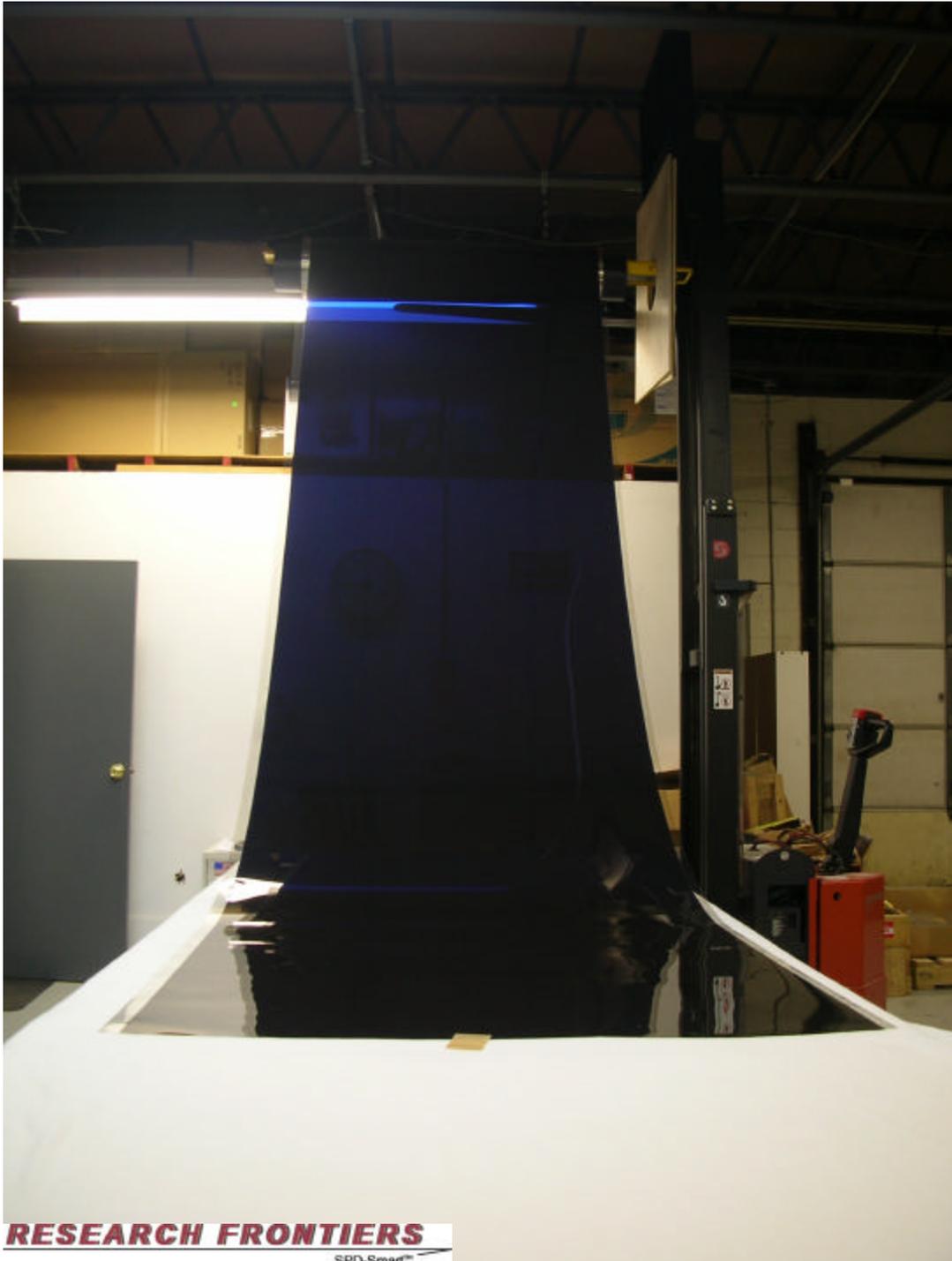
# I. COMPANY OVERVIEW

# Research Frontiers Incorporated

- The developer and licensor of suspended particle device (SPD) light-control technology
- Over 500 patents/patent applications worldwide
- 35 world-class licensees serving global, diversified markets
- Licensee can use SPD film technology to produce, distribute and specify SPD-Smart products for architectural, aerospace, automotive, marine and other applications
- Nasdaq: REFR



Corporate headquarters in Woodbury, New York



**RESEARCH FRONTIERS**  
SPD-Smart™



Wide-width, roll-coated SPD film in its dark and clear states. Photo courtesy of Innovative Glass Corporation. SPD film supplied by Hitachi Chemical Co.



Window installed on Hawker Beechcraft King Air aircraft. Photo courtesy of InspecTech Aero Service, Inc.

# Business Strategy

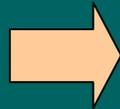
- **Develop, Own, Protect and License SPD Technology**
    - 500+ patents/patent applications
    - Cumulative investment: \$74.0 million (As of Mar. 31, 2009)
  - **Attract World-Class Licensees**
    - 35 companies currently licensed
      - Many of the world's leading chemical, film and glass companies
      - Most of the world's architectural and automotive glass production
      - SPD film now in commercial production
      - Customer adoption has begun
    - **Leverage:**
      - Expertise
      - Resources (e.g. production, sales, distribution)
      - Reputation
    - **Serving global, diversified industries:**
      - Aerospace
      - Architectural
      - Automotive
      - Marine
- 
- Windows
  - Doors
  - Skylights
  - Partitions
  - Sunroofs/roof systems
  - Sunvisors
  - Other Products

# Business Strategy

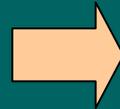
- **Build Demand for SPD-Smart Products**
  - Potential licensees
  - OEMs
  - Architects/specifiers/designers
  - Consumers
- **Scalable Business Model Through Licensing**
  - Minimizes RFI's capital expenditures/expenses
  - Revenue sources
    - Earned Royalties
      - 5%-15% of net sales (revenues) of SPD-Smart end-products
    - Minimum Annual royalties/Fee Income
    - Expenses are primarily fixed; most revenues should flow directly to bottom line

# SPD Licensee Supply Chain

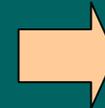
**Light-Control  
Technology  
Supplier**



**Chemical  
Emulsion  
Suppliers**



**SPD Film  
Suppliers**



**SPD End-Product  
Manufacturers**

**Research Frontiers**

**DIC Corporation\***  
**DuPont**  
**Hitachi Chemical Co.**  
**Isoclima S.p.A.**  
**Polaroid Corporation**

**DIC Corporation\***  
**DuPont**  
**Film Technology  
International**  
**Hitachi Chemical Co.**  
**Isoclima S.p.A.**  
**Nippon Sheet Glass**  
**Polaroid Corporation**

AGC Automotive Americas  
AGC Flat Glass Europe SA  
American Glass Products  
Asahi Glass Company  
Avery-Dennison  
BOS Automotive  
BRG Group/Reid Glass  
Craftsman Fabricated Glass  
Cricursa  
Custom Glass Corp.  
DuPont  
GKN Aerospace  
Hotel Technologies  
Innovative Glass Corp.  
InspecTech Aero Services  
Isoclima S.p.A.  
Lang Mekra  
Kerros/IntelliTint  
Laminated Technologies  
Leminur, Ltd.  
Pilkington plc  
Pittsburgh Glass Works  
Prelco  
Saint-Gobain  
SmartGlass International  
SPD Control Systems Corp.  
SPD Systems  
SPD Technologies  
ThermoView  
Traco, Inc.

\* DIC Corporation (formerly known as Dainippon Ink & Chemicals Inc.)

# Ownership and Balance Sheet Highlights

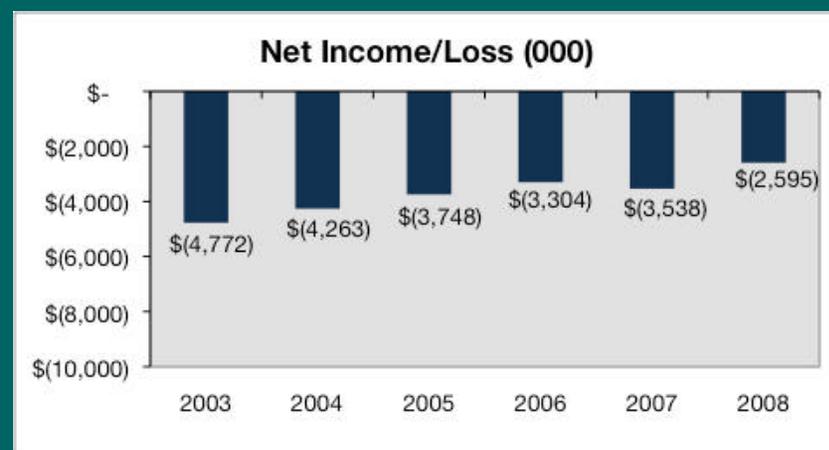
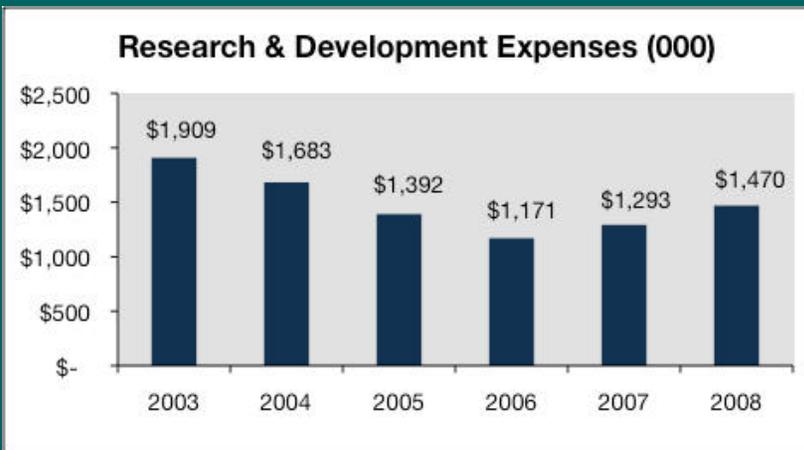
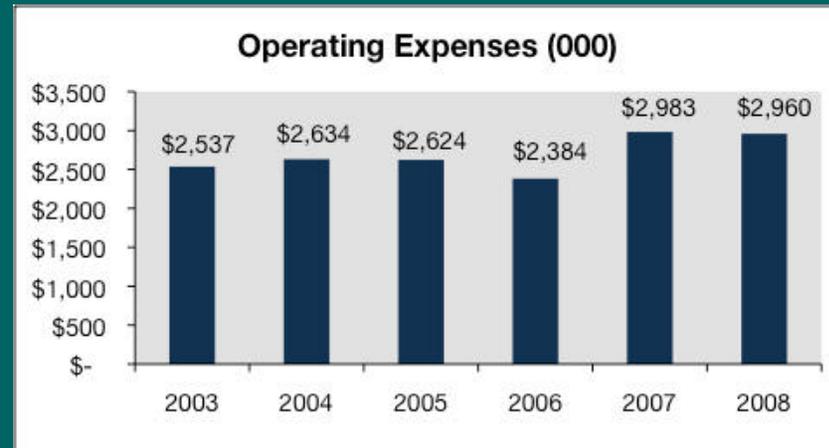
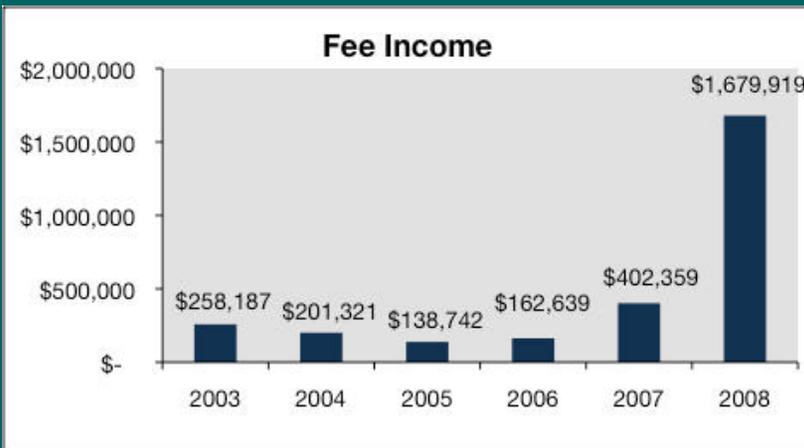
## ■ Ownership

- Total shares outstanding (TSO): 15,742,784 (As of Mar. 31, 2009)
- Insider ownership (Beneficial): 16.02% (Proxy Statement, April 30, 2009)

## ■ Balance Sheet as of March 31, 2009

- Cash/cash equivalents: \$3,520,319
- Working capital: \$3,208,479
- No debt

# Selected Performance Trends



(10-K 2003-08)

In 2007, additional non-cash charges were incurred to operating expenses (\$2,790,656) and research and development expenses (\$1,236,199). These non-cash charges increased the Company's net loss for 2007 by \$4,026,855 to \$7,565,218.

## II. SPD-SMART™ LIGHT-CONTROL FILM TECHNOLOGY

# How SPD Technology Works

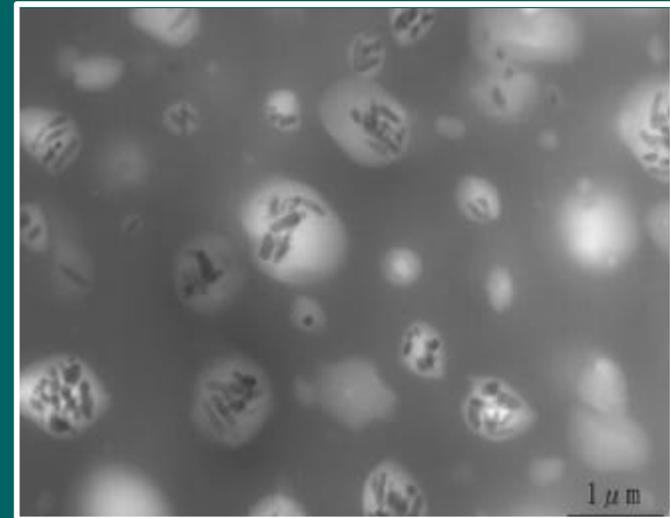
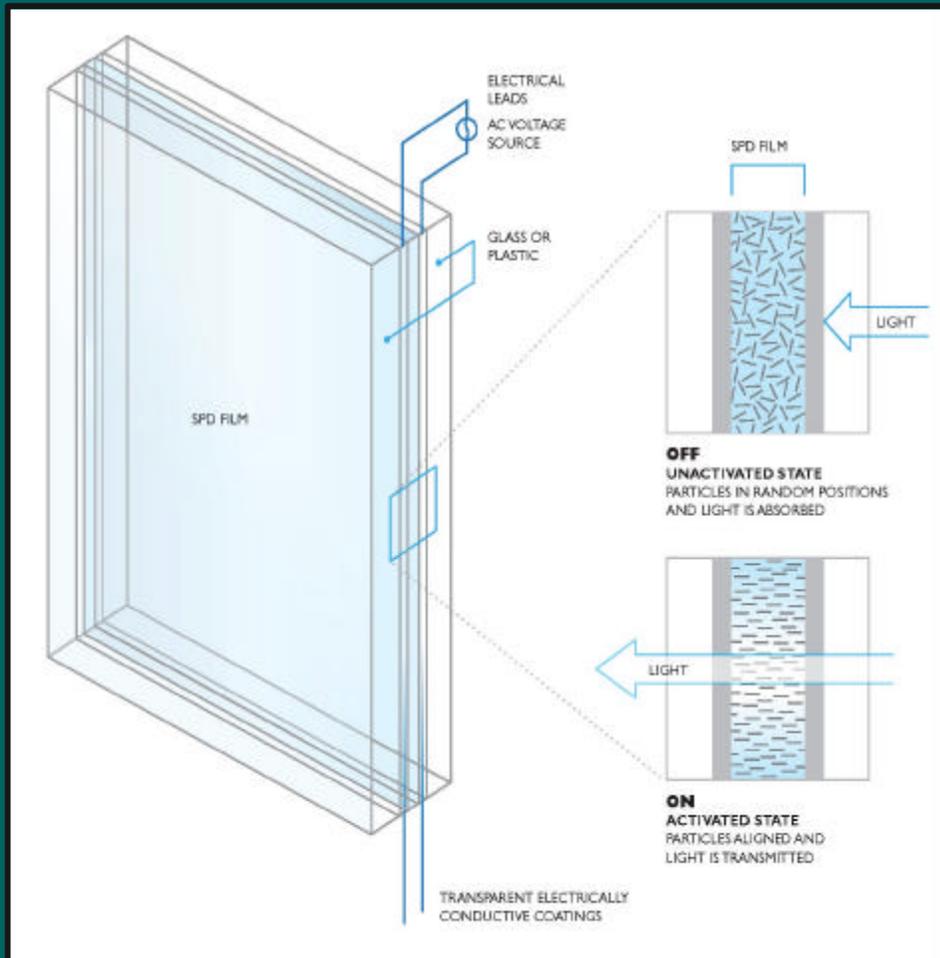


Image courtesy of Hitachi Chemical Co., Ltd.

## Demonstration

Within patented SPD film are millions of microscopic particles that randomly orient when no voltage is present. As voltage is introduced, the particles align and allow light to pass. Adjusting the voltage allows users to regulate or “tune” the glazing to any desired state between dark and clear. The film is laminated between panes of glass or polycarbonate to produce SPD-Smart windows, doors, skylights, partitions, sun roofs and other products.

# SPD Film Transforms Products Into SPD-Smart Products



- Instant and precise light-control
- Energy savings
- Glare reduction
- > 99% UV protection
- Aesthetics
- Low maintenance
- Innovation
- Noise reduction
- Impact resistance
- Weight savings
- Space savings
- Safety and security
- Occupant comfort and well-being

# Other Smart Window Technologies

## Liquid Crystal (LC)

- On-off only; no tunable light-control
- Scatters but does not block light (window treatments typically still needed to provide shading)
- Contrast ratio: <1.5:1. Light transmission range (example): 58% to 77%
- Primary application: interior architectural partitions

## Electrochromic (EC)

- Slow, non-uniform switching that varies depending upon panel size; Just two states usually offered by suppliers – clear and tinted
- Contrast ratio: <20:1. Typical light transmission ranges:
- Cannot readily be integrated with plastics
- Susceptible to voltage spikes
- Difficult to coat to curved surfaces
- Difficult to achieve “very dark” states; (window treatments typically still needed to achieve privacy)
- Primary application: small-format self-dimming automotive mirrors



<b>Saint-Gobain: 0.8% to 16.0%</b>
<b>Sage: 2.8% to 48.0%</b>
<b>ChromoGenics: 18.0% to 73.0%</b>

# Key Features of SPD Film

<b>Light-control</b>	“Tunable” to any point between dark and clear, thus yielding an infinite number of light transmission states; Light transmission range (example): 0.25% to 50%; Contrast ratio: >170:1. Light transmission, shading and privacy in one system.
<b>Switching</b>	Fast, consistent and uniform regardless of panel size
<b>Energy Efficiency</b>	Very low power consumption (approximately 0.06 watts/ft <sup>2</sup> )
<b>UV Protection</b>	Blocks more than 99% of UV
<b>Durability</b>	Excellent - no upper limit to switching cycles observed; impact-resistant when laminated
<b>Design Flexibility</b>	Can be laminated with glass or weight-saving plastic; curved surfaces are possible

# The Clean Technology Potential of SPD-Smart Products

- **Architectural Daylighting**
  - Utilization of natural light (i.e. daylight) entering the interior of a building to:
    - Reduce energy used for artificial lighting (US DOE Goal: By 2025, 50% reduction in the energy used to illuminate buildings<sup>1</sup>)
    - Lower heating and cooling costs
    - Increase occupant well-being and productivity
    - Decrease environmental impact
- **2008 Survey of US LEED Accredited Professionals<sup>2</sup>**
  - 92.5% expect demand for solar control building products to increase over the next 5 years
  - 87.6% likely to recommend smart glass for a project if it meets performance specifications and is reasonably priced

Source: 1.) US Department of Energy, Building Technologies Program. 2.) 2008 Survey of US Leadership in Energy and Environmental Design Accredited Professionals by Research Frontiers Inc.

# Transforming Conventional Windows into SPD-Smart Windows

<b>Conventional Window with Static Tint and Interior Blind/Shade</b>	<b>SPD-Smart Window</b>
Static window tint degrades view to outside during low/no-sun periods	View to the outside is optimized even during low/no-sun periods
Partial shading from interior blind obstructs view	Variable shading does not obstruct view
Space consumption is relatively high	Space consumption is relatively low
Shading/privacy requires manual effort to close blinds or activation of expensive motorized shade	Sensors adjust light conditions automatically; manual light-control is as simple as turning a dial
Occupants less likely to control/optimize light levels	Ease-of-use and integration with sensors optimizes light levels
<b>Daylighting benefits are not optimized</b>	<b>Daylighting benefits are optimized</b>

# Award-Winning SPD Technology



**“SPD technology offers exceptional benefits across multiple sectors. In architectural applications, key value drivers are SPD’s energy efficiency and daylighting ability, while for aerospace applications where light levels are especially intense, weight-saving SPD glazings reduce maintenance and offer an unprecedented combination of dynamic control of light, glare and heat through windows. Likewise, in response to the trend in automotive towards larger panoramic sunroof systems in response to consumer demands for brighter and more open vehicle interiors, SPD glazings are able to instantly deliver desired shading levels automatically or at the touch of a button.”**

**-- Archana Jayarajah, Technical Insights Research Analyst, Frost & Sullivan**



# III. MARKETS

# Market Forces Accelerating Demand for Light-Control

## Architectural

- Energy conservation/sustainability/daylighting
- Greater use of glass
- Safety and security
- 99% UV protection

## Aerospace

- Fuel efficiency/weight reduction
- Enhanced passenger experiences
- Flight attendant control
- Glare reduction
- Low maintenance/no moving parts

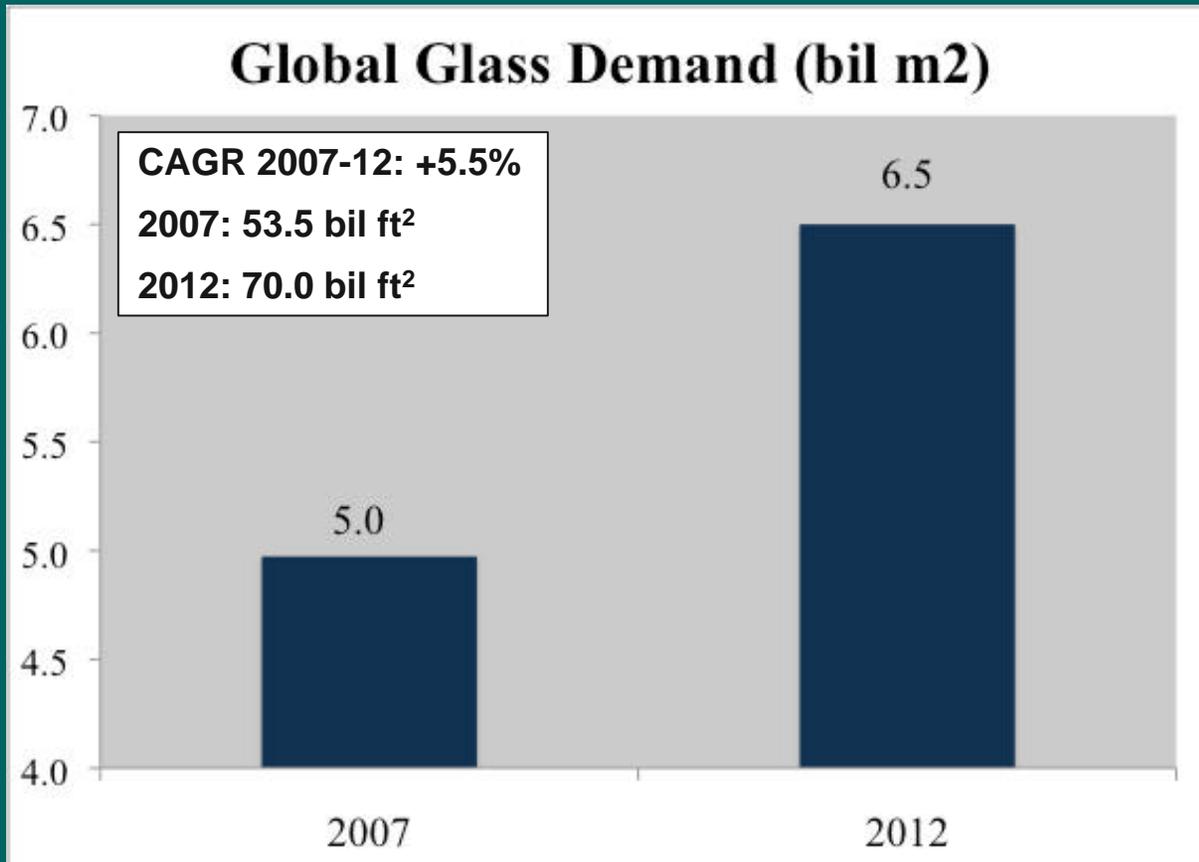
## Automotive

- Fuel efficiency
- Trend toward larger roof/glass systems
- Need for light, glare and heat control
- Brand innovation/differentiation

## Marine

- Glare control
- Shading without loss of view
- Clear glazings for nighttime operation
- UV protection
- Avoidance of heat build-up

# Global Demand for Glass is Increasing

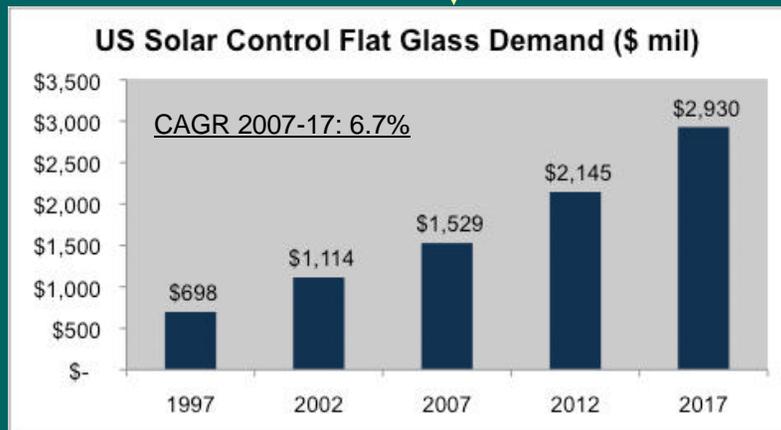
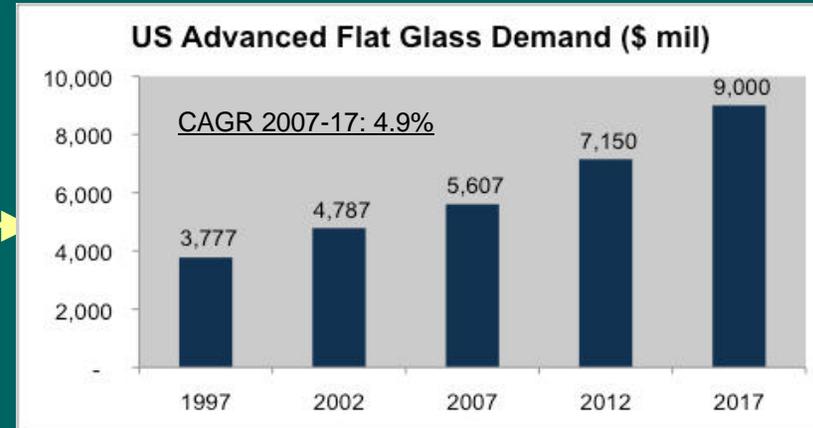
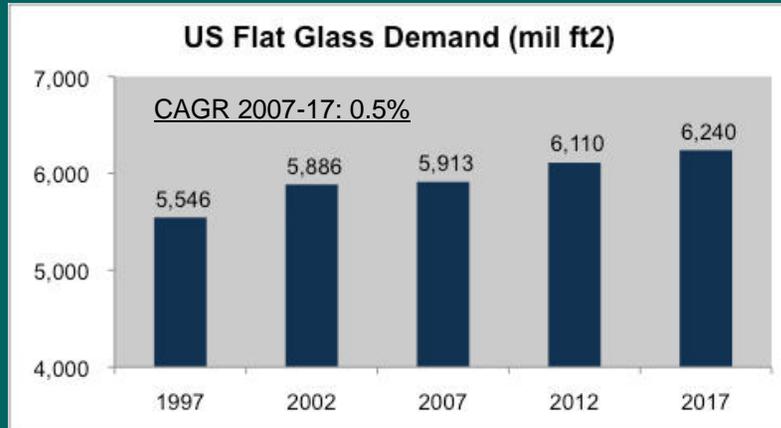


“Sales of new generations of security and fire-rated glass, self-cleaning glass, and smart windows that promise unprecedented control and energy savings also will accelerate through 2010.”

- The Freedonia Group

- Construction: 59.3%
- Motor vehicle: 26.5%
- Specialty: 14.2%

# SPD-SmartGlass: In the Sweet Spot of the Glass Market



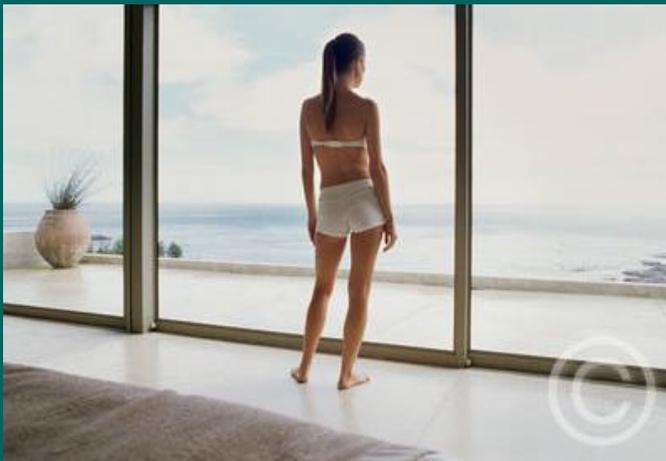
Source: The Freedonia Group

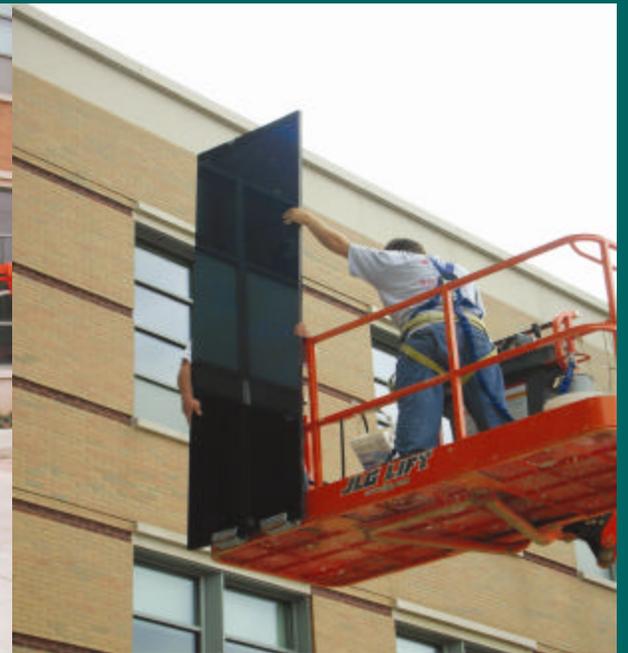
“Solar control flat glass, the second largest group of advanced flat glass products, will continue to post above average growth through 2012. In particular, demand for smart glass is expected to finally have a significant impact outside of the electrochromic mirrors and liquid crystal display privacy glass that have been available for some years. **The much-awaited commercial roll-out of suspended particle device (SPD) smart glass technologies is now expected to occur, sparking well above average growth for the category through 2012.** Other types of solar control glass, such as low-emissivity glass and reflective glass, will post slower but nonetheless strong growth.”

The Freedonia Group  
June 10, 2008

SPD-Smart light-control technology can be used in many commercial applications.

# Architectural Applications





SPD



# Aerospace





SPD



# SPD-Smart Aerospace Windows Installed on or Engineered For:



- Airbus (various models)
- Bell/Textron 430 Helicopter
- Boeing (various models)
- Bombardier Global Ex and Challenger 601,604
- Bombardier LearJet 24,25,31,35,36,45,55,60
- Cessna Citations I, II,III,525,525A,550,Excel,5,CX
- Dassault Falcon 10,50
- EADS Eurocopter EC 155
- Gulfstream (all models)
- Piaggio P-180 Avanti, and Pilatus PC-12
- Raytheon Beechjet
- Raytheon Hawker 700, 800
- Raytheon King Air 90,100,200,350
- Sikorsky S-92 Helicopter



# Raytheon Aircraft Offers SPD-Smart Window Shades for Beechcraft® King Air



February 9, 2007

Raytheon Aircraft Company announces it is offering window shades using Research Frontiers' SPD-Smart light-control technology for all models of its Beechcraft® King Air aircraft.

There are approximately 6,200 King Air aircraft in operation worldwide.

Raytheon Aircraft is now owned by Hawker Beechcraft Corporation.

# Beechcraft® King Air - Many “Firsts”

## For the first time:

- The FAA has issued an STC (supplemental type certificate) for an electronically dimmable window shade, or “smart window.”
- An electronically dimmable window shade, or “smart window,” has been proven durable and safe enough for a fleet of aircraft.
- Five year warranty is one of the longest in the industry.
- Aircraft owners can buy electronically dimmable window shades from a manufacturer.

# SPD-Smart Window Shades in Beechcraft King Air Aircraft



## Electronic Window Shade System

Beechcraft King Air Series

### Description:

This system is designed to safely and efficiently provide cabin windows with electronically dimmable window shade capability to maximize passenger comfort and protect cabin interior.



**Raytheon**

**“We had been evaluating dimmable window shade technology for the past couple of years. The fast switching speed, wide range of light transmission, longevity, superior performance and lighter weight are features we were looking for to enhance our product line. This product is in line with our business strategy to provide world-class service, increase customer satisfaction with their aircraft and flying experience, as well as reducing customers’ operating costs and aircraft downtime. To that end, we are offering a 5-year warranty on these electronic window shades, one of the best warranties in the business.”**

**-- Randy Groom, President, Global Customer Service and Support, Raytheon Aircraft Company**

# Other Hawker Beechcraft Aircraft Expected to Use SPD Technology



Premier 1



Hawker



Beechjet

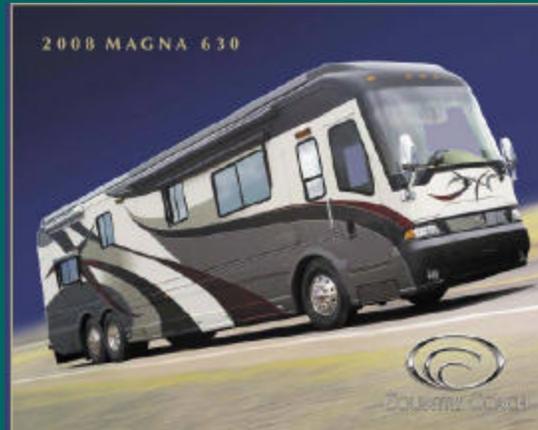


Other OEMs

# Marine



# Rail, Coach and Recreational Vehicle (RV)



# Automotive



SPD – Fiat Croma with Cromalite®

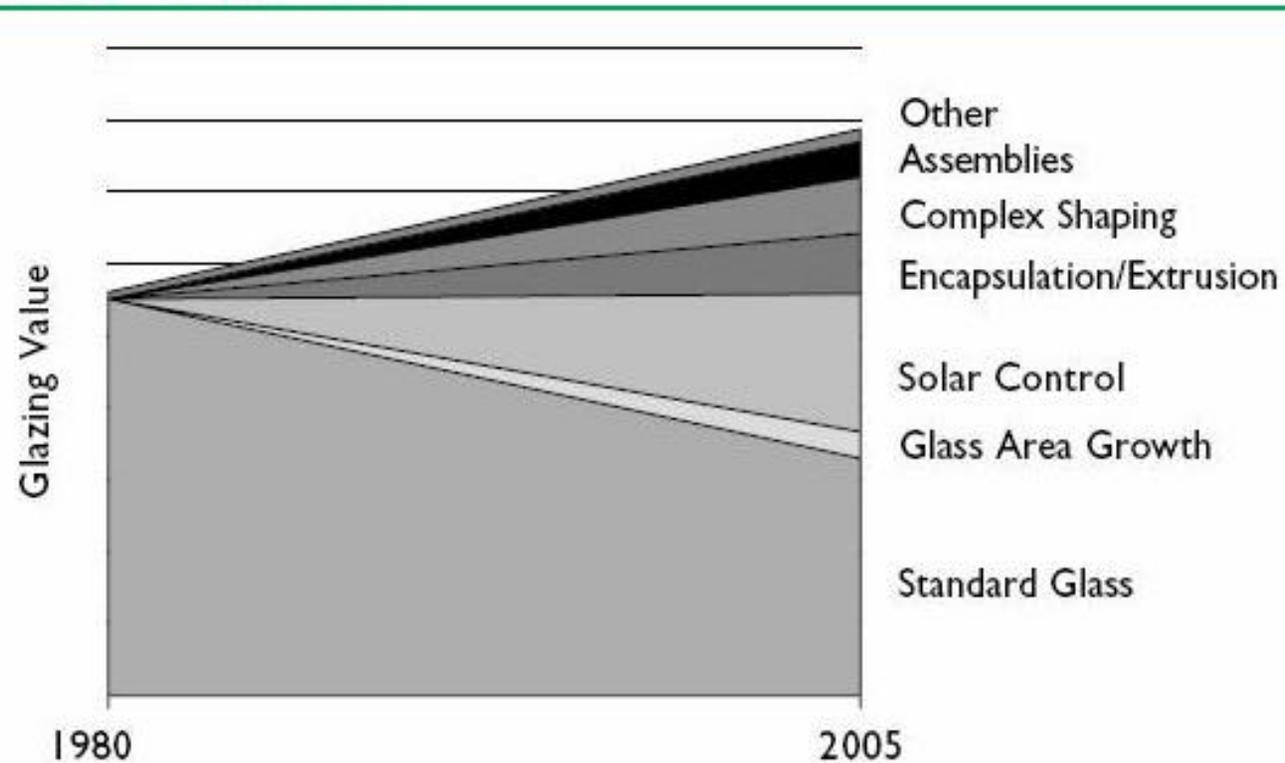


SPD – DiMora Natalia SLS 2



# Growth of Solar Control Glass in Automobiles

*Glazing in a Typical European Car*



Source: Pilkington

# Many Applications for Automotive SPD-Smart Glass

- **Sunroofs**

2004: \$2 billion

2006: 15 mil units (25% “take rate”)

2010: 22.4 mil units

CAGR 2006-10: 10.7%

- **Panoramic Roofs**

2003: 2% of total

2010: 40%

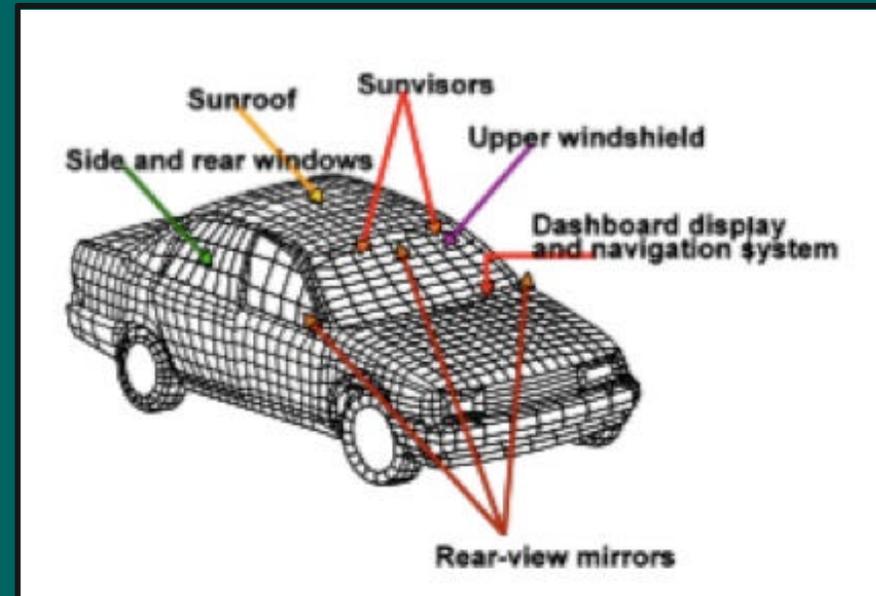
- **Sunvisors**

130 million units/year

- **Rear-view mirrors**

150 million units/year

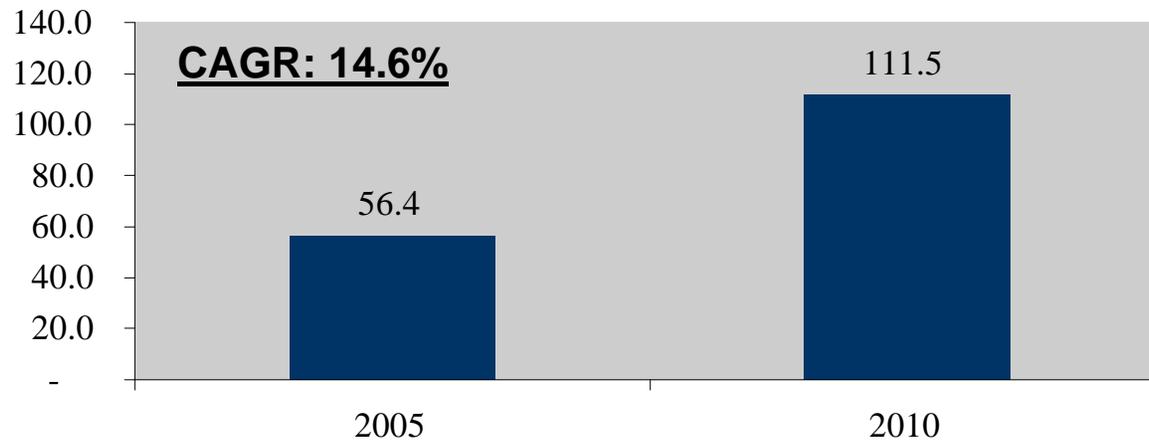
(18.3 million electrochromic)



The number of vehicles incorporating all-glass roofs, long strips of glass or more expansive sunroof areas is growing.

# Automotive Sunroof Glazing: Growing 14.6% Per Year

**Worldwide Annual Sunroof Sales -  
Glazing Area (mil ft<sup>2</sup>)**



## Market Forces:

- Increasing popularity of sunroof/panoramic roof systems
- Growing size of these systems

# All-Glass Roofs, Long Strips of Glass and More Expansive Sunroof Areas Are Increasingly Common



Mercedes R500 Sports Tourer



Lexus LF-A Concept

The images on this page were taken from vehicles on public display at the New York Auto Show and are to demonstrate design concepts. They are not actual SPD-Smart product installations.

# Toyota Hino S'elega Premium Concept Motorcoach

- Introduced October 24-25 '07 at the Tokyo Motor Show
- Over 120 ft<sup>2</sup> of SPD-SmartGlass on side of bus
- Five very large windows (1.1 x 2 meters)(43.4 x 81 inches) are largest and most optically clear smart glass ever installed on an automobile
- Instant, uniform light-control without the need for shades or blinds



Photograph courtesy of Hino Motors, Ltd.

# American Glass Products (AGP) Launches VarioPlus Sky SPD-SmartGlass

## ■ VarioPlus

- Side and back windows now available for 22 vehicle models in the US
- 4 additional models under development
- Sunroof being developed for over 50 models in US
- Additional models available or under development for international market
- Custom manufacture possible for virtually any vehicle
- Global marketing campaign aimed at OEMs and the aftermarket
- Product launch at SEMA Show (October 30-November 2, '07)

## IV. THE OPPORTUNITY

# Convergence: Technology and Market

- **Technology**

- High-performing SPD-Smart “2<sup>nd</sup> Generation” film is now in production

- **Markets**

- The need for advanced light-control is substantial and growing in many large commercial markets.
- Adoption of SPD-Smart light-control technology by major customers has begun.

**Research Frontiers is ideally positioned to leverage its strong intellectual property portfolio and its scalable licensing business model to generate significant and growing amounts of royalty income.**

# Recent Developments

<b>March '09</b>	InspecTech Aero Service exhibits SPD-Smart Aerospace window shades at the 2009 Aircraft Interiors Expo in Hamburg, Germany and 2009 Aircraft Electronics Association International Convention and Trade Show in Dallas, Texas
<b>March, '09</b>	Research Frontiers begins to host events at the new SPD-SmartGlass™ Design Center in Woodbury, New York
<b>Feb. '09</b>	Innovative Glass completes world's largest state-of-the-art SPD-SmartGlass™ project at Indiana University Health and Translational Science Building
<b>Oct '08</b>	American Glass Products (AGP) partners with DiMora Motorcar, providing its Vario Plus-Sky brand of SPD-SmartGlass™ for DiMora's Natalia SLS 2 sport luxury sedan
<b>Oct '08</b>	Fiat Croma automobile and BMW armored glass window debut at Security Essen 2008 featuring Isoclima's Cromalite® brand of SPD-SmartGlass

# Recent Developments

<b>Oct '08</b>	Pittsburgh Glass Works acquires license from Research Frontiers to manufacture and sell SPD-SmartGlass automotive glass products
<b>Oct '08</b>	Jaguar 85 foot production yacht equipped with Isoclima's Cromalite® brand of SPD-SmartGlass is featured at Genoa, Italy Boat Show
<b>Sept '08</b>	SmartGlass International's SPD-Smart architectural window product wins the Most Innovative Product Award at the 100% Detail Show in London, England
<b>Mar '08</b>	GKN Aerospace obtains license to offer SPD-Smart automotive armored glass
<b>Oct-Nov '07</b>	American Glass Products launches global marketing campaign for SPD-Smart Vario Plus-Sky brand at SEMA Show

# Recent Developments (Continued)

<b>Oct '07</b>	Toyota Hino S'elega premium concept motorcoach introduced at Tokyo Motor Show
<b>Oct '07</b>	Craftsman Fabricated glass obtains license to manufacture and offer SPD-Smart laminated glass and plastic products
<b>Feb '07</b>	Raytheon Aircraft Company announces adoption of SPD-Smart window shades manufactured by InspecTech Aero Service for King Air aircraft
<b>Feb '07</b>	Hitachi Chemical Company announces shipments of mass-produced wide-width film

# Research Frontiers Investment Highlights

- **World's Highest-Performing Light-Control Technology**
- **Large and Growing Demand**
- **Strong Intellectual Property Portfolio**
  - Over 500 patents/patent applications worldwide
  - Cumulative investment: \$74.0 million
- **Total Shares Outstanding: 15,742,784**
- **Strong Financial Condition**
  - \$ 3,520,319 in cash/cash equivalents as of March 31, 2009
  - No debt
  - Modest, predictable expenses
- **Licensing Model**
  - Earned royalties of 5%-15%
  - World-class licensees
    - Leading chemical, film and glass companies
    - SPD film in commercial production and customer adoption begun

# Research Frontiers Incorporated

Nasdaq: REFR

*SPD-Smart* Light-Control Film Technology

[www.SmartGlass.com](http://www.SmartGlass.com)

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