FROST & SULLIVAN

Innovations in Precision Fermentation Technologies, Biomaterials and Smart Materials

High-Tech Materials Technology Opportunity Engine

Global Technology, Innovation, and Convergence Practice

D737-TV, November 2023

The Growth Pipeline™ Company
Powering clients towards a future shaped by growth

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UV Stable 3G Switchable Film and Smart Glazing for Wide Indoor and Outdoor Applications

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COMPANY NAME
Scienstry

TECHNOLOGY
-

TYPE OF OWNERSHIP
Private company

YEAR FOUNDED
1992

HEADQUARTERS
Texas, USA

KEY MARKETS
USA, Europe

INVESTMENT STAGE
Internal

TOTAL FUNDING
-

TOTAL REVENUE
-

EMPLOYEES
<25

ABOUT THE COMPANY

Scienstry is a leading innovator and manufacturer of liquid crystal (LC) switchable film or smart film. It has invented many new technologies and new products and solved many fundamental problems related to smart film and smart glazing and developed a superior product system of 3G Switchable Film™. The company operates with a strong research and development background and has a deep understanding in smart glass and LCD technologies. With a fusion of materials, processes and equipment technologies, the company has developed a series of liquid crystal-based products that provide the best-in-class solutions for smart glazing applications. The new products and technologies face great emerging markets.

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Technology Snapshot

Scienstry, a R&D oriented company, has developed a new 3-Gen LCD film, Non-homogenous Polymer Dispersed - Liquid Crystal Display (NPD-LCD) with a patented non-linear optical polymer system. NPD-LCD has a non-linear or gradually changed polymer phase that requires only refractive index matching between liquid crystal and an inner layer of polymer phase. This does not require optical matching between liquid crystal and entire polymer phase. This technology creates a great freedom to continuously improve performance and add new features with chemical and physical modifications in comparing with earlier generation technologies. That's why the 3G system can keep providing new features and new products.

What Problem does the Technology solve?

3G Switchable Film technology offers milky white films and dark films and has solved many of the important and fundamental challenges faced by conventional Polymer Dispersed Liquid Crystal (PDLC) technology that are not suitable for outdoor applications and projection applications and suffer from inherent limitations due to non-uniform droplet sizes, haze issue, high driving voltage, narrow range of working temperature, narrow viewing angles, short product lifetimes, instability for UV and IR, etc. for over three decades. Entering great emerging market of outdoor applications is very important to the smart glass industry. The 3G technology revitalizes the old smart glass industry.

Attributes

All weather application

For over three decades, none of liquid crystal smart film and smart glazing can be used for any outdoor application because of UV instability and narrow range of working temperature. The LCD smart glazing with 3G Switchable Film™ can be comfortably used for outdoor applications with weather temperature ranging from -30°C to 80°C (or higher). The capability for outdoor applications and many unique features prove its high performance.

Exceptionally long operational lifetime

3G Switchable Film™ has improved UV stability more than 50-100 times in comparing with PDLC film with more than 100 million on-off switches. Years long actual sunlight tests and simulation experiments on the films show a service lifetime of the smart glazing may be over 100 years, turning the decorative smart glass into a durable product that matches the lifespan of ordinary glass.

Front and rear projections

With a patented unique feature of spherical scattering, 3G Switchable Film™ and switchable projection glazing are suitable for both front projection and rear projection with a short-throw projector to avoid all of annoying surface reflections, and avoid to use of expensive anti-reflective glass to make the switchable projection glazing.

Source: Frost & Sullivan

Scienstry - Value Proposition

Technology Assessment

According a basic business rule, a new feature determines a new application of a product which in turn determines an emerging market. Scienstry's innovations with some game-changing breakthroughs and new products and new manufacturing processes give Scienstry a great advantage for market competition. New features such as UV stability, front projection, and 360-degree view face a huge emerging market for outdoor applications, breaking many limitations of only indoor uses for conventional LC smart glass. The technologies can virtually turn any ordinary window into a TV display including turning an entire building into a giant TV display. The proprietary technologies of UV stabilization, sandwich with thin air-layer and Vacuum Liquid Resin Lamination (VLRL) have great advantages for making high-performance products. VLRL technology allows to make the smart glazing with the smart film in any place without use of any large equipment at a fraction of the costs. The VLRL technology is not only suitable for making smart glass, but also for making conventional laminated glass and bulletproof glass with a better quality and 50% cost reduction.

Strategic Analysis

S – Strengths

- High stability for UV, IR, moisture and heat for indoor and outdoor uses.
- Driving with a safe voltage under 50V.
- Achieved for both high transparency and high opacity with very wide viewing angle.
- Capable for front and rear projections.
- Very long lifespan of the products
- The above features set new standards for 3-Gen LC smart film/glass. No other similar products can achieve one of these features.

W – Weaknesses

- The newer technologies make their products slightly expensive because the production scale is limited by the nature of R&D oriented company. The company is striving to achieve price reduction. The company encourages technology transfer to achieve large-scale production. This not only enjoys a high profit margin in emerging market with less competition, but also has huge competitiveness to expand its share in old indoor market of smart glass.

O – Opportunities

- 3G Switchable Film and related glazing technologies find many opportunities in privacy, energy saving window for building, automobile, green and informative buildings, storefront advertising, and traffic signs, etc.
- If the outdoor applications can be quickly promoted with large scale of production, the industrial upgrading will happen, just like in many other industries, such as LCD TV vs CRT TV and digital camera vs film camera.

T – Threats

- No potential threats observed with emerging market created with its proprietary technologies and products for the company established over 30 years ago.
- The fact that it has a long history of operation, holds the largest share of IP for breakthrough technologies in the field, has set many world records in many world-class projects and develops only solely on its own capital shows its business strength.

IP/ Patent Activity

Scienstry holds numerous patents related to apparatus and methods of making 3G Switchable Film™ and related new smart glazing for outdoor applications, as well as new apparatus of normal laminated glass and bulletproof glass with advantages in performance and cost. Scienstry is promoting the applications with a simple requirement without a complicated licensing program and royalty for small or medium production. Contact Scienstry for detail.

Future Focus Areas

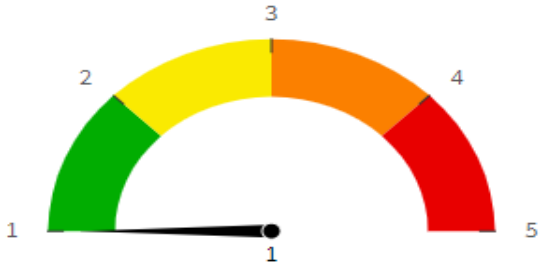
Scienstry wishes to convert its technological advantages into market advantages to quickly capture the emerging markets created by its new products and new applications. Scienstry is open for dealership and distributorship opportunities to expand their footprint in different regions of the world by providing great discounts and support. The company is also open for investment, patent licensing and technology transfer. The new technologies provided by Scienstry not only provides superior products but also can reduce costs of production.

Source: Frost & Sullivan

Scienstry - Investor Dashboard

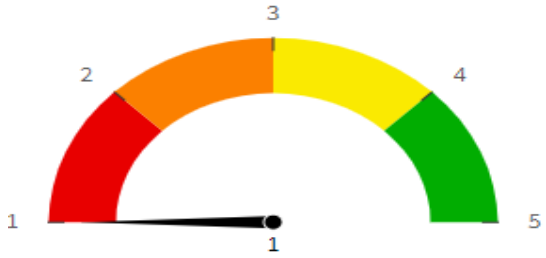
GROWTH INDEX

Risk Analysis



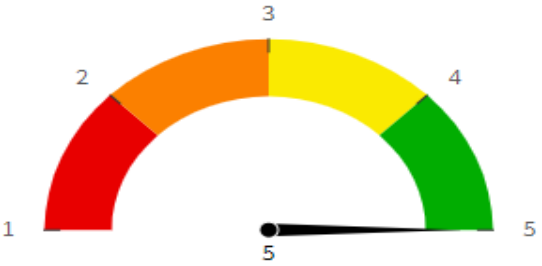
- The technology has low risk as Scienstry has laid three decades of solid foundation in the field of LC smart glass technologies and established itself as a leading LCD innovator. The company has many patents for 3G Film/Glazing related technologies and has accomplished many world class projects.

Revenue Magnitude Potential



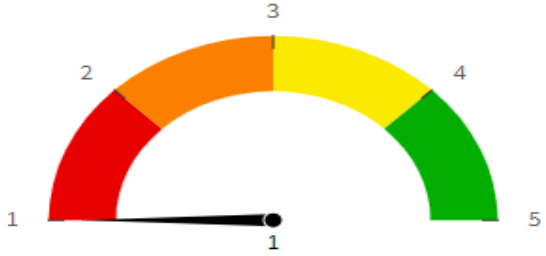
- Scienstry has accomplished some world's largest projects and has detected surging emergent market penetration for smart glass technologies in other different industries. Their over 100 innovations and the emerging markets they created are poised to fuel the revenue potential in forthcoming years.

Buzz Worthiness



- Scienstry's products have been tested by several renowned architectural and automobile companies and passed their internal tests with all requirements of OEM. It has won Frost & Sullivan's New Product Innovation Award in 2018.

Investor Lens



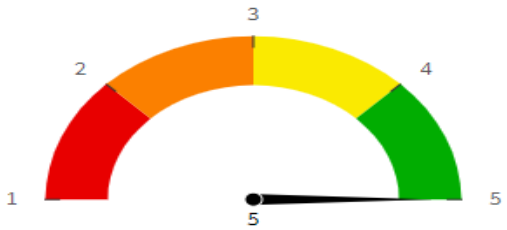
- Scienstry is one of very few R&D oriented companies that relies solely on its products and technologies to achieve great success in R&D. The company is open for investment to accelerate expansion into the emerging markets created by its new products and applications.

Source: Frost & Sullivan

Scienstry - Investor Dashboard

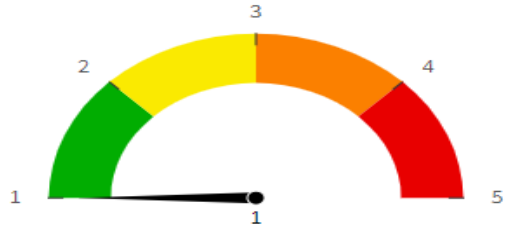
INNOVATION INDEX

Commercialization Readiness Level



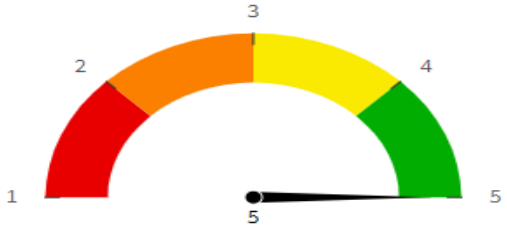
- The technology has been commercialized and applied in several world-record projects such as Beijing Summer Olympics 2008, World Expo Shanghai 2010, covering an entire super yacht SWIFT 141 with 3G film/glass, Rolls Royce luxury sedan, turning architectural complex in Manila Philippine into giant TV displays. The company has successfully built several mass production lines and set new standards for 3G of smart glass/film manufacturing. Patented several new structures of smart glazing and normal glazing.

Technology Competition Level



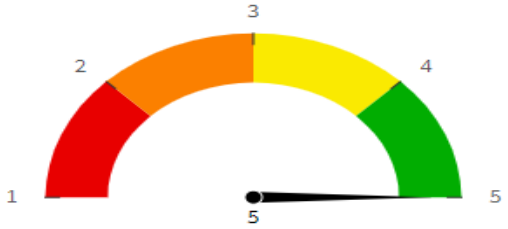
- Scienstry has developed 3G switchable film technology with unique attributes that its competitors are not offering and hence does not face any technology competition because of patents, especially for outdoor applications.

Regional Impact



- The primary markets are USA and Europe and have operations in other countries.

Application Potential



- Outdoor infrastructure, indoor projection, touchscreens, displays for architecture, aerospace, automotive, TV, traffic signs, etc.

Analyst's Insights

Conventional PDLC films do not possess all the desired qualities and are unsuitable for outdoor applications and projection applications. Scienstry has solved many fundamental challenges and developed 3G Switchable Film and related glazing breaking through many limitations of conventional smart film and smart glass with multiple benefits heralding a new era for outdoor applications and projection applications and energy saving applications, etc. New features link glass industry and display industry together. The outdoor markets are much greater than indoor market for the smart glass. Scienstry creates a non-linear optic system which has many advantages in new feature developments. Their patented technologies offer unique attributes such as UV stability, energy saving, privacy, front or rear projections and 360-degree view that can make an ordinary glass a valuable surface. This is not possible with conventional theory of PDLC.

Source: Frost & Sullivan

Appendix

Criteria for Rating of Innovations--Explanation

Technology Competition Level (TCL) (Qualitative criteria)	Technology competition level – This is a measure of competition from current and emerging competing technologies and innovations and how it will impact the growth of the company's innovation. **TCL index of 1 & 2 is low, 3 is medium and 4 & 5 is high.**
Buzzworthiness (Qualitative criteria)	Buzzworthiness is the ability of the innovation or the company to create the widespread attention the company or the innovation deserves. This also is the ability of the innovation or company to attract end users due to the uniqueness in their technology / product. **Buzzworthiness Index of 1 & 2 is low, 3 is medium and 4 & 5 is high**
Commercialization Readiness Level (CRL)	CRL is the index which assesses the readiness of the innovation for introduction to a specific industry or market. **1- (upto prototype development), 2–(Pilot scale demonstration) , 3– (Small scale commercialization/Early stage), 4 – (Mid to Large scale commercialization), 5 – Wide spread established market acceptance/ commoditized product in various application fields or in regions**
Investor Lens	Investor lens captures the financial performance metrics including the funding, grants, and the investor portfolio of the company which will facilitate its growth in the near future. **1- upto $USD10 million, 2: $USD 10 to 20 Million, Index 3 is medium - $20-30 million, Index 4 and 5 is high: 4 :$USD 30 to 40 million and 5 is more than $ USD 40 million.**
Risks(Qualitative criteria)	The risks associated with the innovation that will impact any investment decision or the growth of the technology / product. For ex Policy or regulatory risks can delay and cause uncertainties for commercialization of certain products and this hamper the company's growth**.** **Risk index of 1 & 2 is low, 3 is medium, 4 &5 is High.**
Revenue Magnitude Potential	This is a measure of 5 year cumulative revenue potential for the company from innovation. **1: upto $ USD 50million; 2: $USD 51to 100 million; 3– $USD 101 to 200 million; 4: $201 to 400 Million; (5) – $USD 400 million and above**
Regional Impact	Regional Impact measures the ability of the company's innovation/ product to expand into the other regional or global market. **1- Local market (within a country), 2- In specific countries within a region, 3 – In a specific geographic region, 4– Adoption in 2 to 3 geographic regions and 5 is widespread global adoption**
Application Potential	Application Potential is the ability of the innovation/ product to be used in a wide range of applications or in different industries. **1 – Only 1 industry, 2- 2 to 3 industries; 3- 3 to 5 industries; 4 : 6 to 8 industries; 5: more than 8 industries**

Source: Frost & Sullivan