

Enabling Technology, Surface Functionalization Technologies North America, 2010

Frost & Sullivan's Global Research Platform

Frost & Sullivan is entering its 50th year in business with a global research organization of 1,800 analysts and consultants who monitor more than 300 industries and 250,000 companies. The Company's research philosophy originates with the CEO's 360-Degree Perspective,* which in turn serves as the foundation of its TEAM Research** methodology. This unique approach enables us to determine how best-in-class companies worldwide manage growth, innovation and leadership. Based on the findings of this Best Practices research, Frost & Sullivan is proud to present the 2010 North American Enabling Technology of the Year Award for Surface Functionalization Technologies to Semprus BioSciences.

Significance of the Enabling Technology Award

Key Industry Challenges

Advances in medical technologies coupled with the needs and requirements of an aging population are just a few critical drivers for new product development within the medical device space. Even though novel medical devices bring about substantial healthcare benefits, nearly half of all medical devices implanted in humans end up resulting in one or more severe complications including thrombosis, infection, improper healing, and cell overgrowth.

A majority of the Hospital Acquired Infections contracted every year are found to originate with the colonization of bacteria in implantable medical devices, which provide a good surface for bacterial growth. These infections, when present on the device surface for a prolonged period, tend to form complex biofilms that act as catalysts for infection and are often untreatable by conventional antibiotics.

Owing to the rapid growth in the use of medical device implants and the lack of improved surface technologies, the medical device industry is in dire need for creation of next-generation devices that improve patient outcomes significantly and minimize healthcare costs by reducing device-related complications. Specifically, engineering of device surfaces to closely mimic the properties of the surrounding tissues could largely aid in preventing complications associated with medical devices by reducing the foreign body response.

Addressing this concern, Semprus BioSciences is finalizing a superior, high-performance biofunctional surface platform that greatly reduces the complications associated with implanted medical devices while improving healthcare cost efficiencies. Semprus BioSciences is a venture-backed biomedical company whose current focused efforts are aimed at enabling the first permanently dual-functional (anti-colonization and anti-thrombogenic) vascular access catheter with a single surface modification. Initially founded within the Massachusetts Institute of Technology's Langer Lab, the company has

since been engaged in developing a next-generation, biofunctional surface platform, which is focused on achieving clinical benefits that far exceed current market opportunities containing silver, heparin, and antibiotic coatings. The firm's Semprus Surfaces™ platform is based on a bioinert, covalently bonded surface modification that reduces the attachment of bacteria, fungus, platelets, and blood proteins to a device. The durability of the Semprus Surfaces technology, along with the potential to provide prolonged activity required for many permanent implants, makes the platform unique.

Impact of Enabling Technology Award on Key Stakeholders

The Enabling Technology Award is a prestigious recognition of Semprus BioSciences's accomplishments in Surface Functionalization Technologies adopted to address medical device infection control. An unbiased, 3rd party recognition can provide a profound impact in enhancing the brand value and thereby accelerating the Semprus BioSciences's growth. As captured in Chart 1 below, by researching, ranking, and recognizing those who deliver excellence and best practices in their respective endeavors, Frost & Sullivan hopes to inspire, influence, and impact three specific constituencies:

- **Investors**

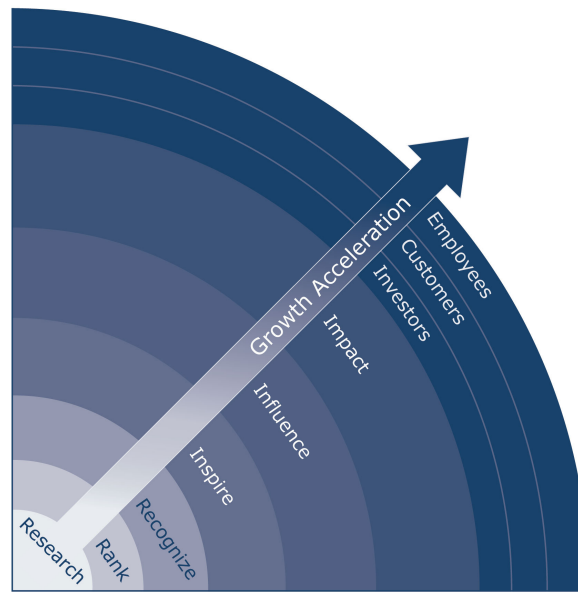
Investors and shareholders always welcome unbiased and impartial third party recognition. Similarly, prospective investors and shareholders are drawn to companies with a well-established reputation for excellence. Unbiased validation is the best and most credible way to showcase an organization worthy of investment.

- **Customers**

3rd party industry recognition has been proven to be the most effective way to assure customers that they are partnering with an organization that is leading in its field.

- **Employees**

This Award represents the creativity and dedication of Semprus BioSciences' executive team and employees. Such public recognition can boost morale and inspire your team to continue its best-in-class pursuit of a strong competitive position for Semprus BioSciences.

Chart 1: Best Practices Leverage for Growth Acceleration

Key Benchmarking Criteria for Enabling Technology Award

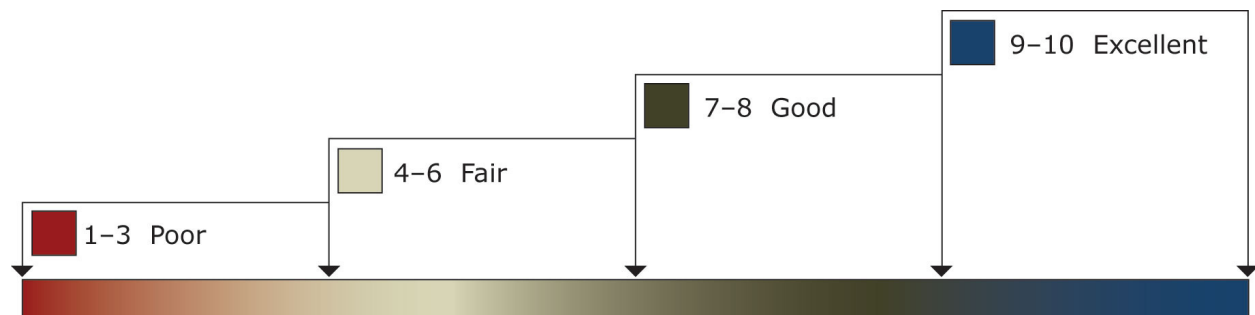
For the Enabling Technology Award, the following criteria were used to benchmark Semprus BioSciences' performance against key competitors:

- **Enables Creation of New Products**
- **Enhances Current Products**
- **Enables New Applications**
- **Potential for Market Acceptance**

Decision Support Matrix and Measurement Criteria

To support its evaluation of best practices across multiple business performance categories, Frost & Sullivan employs a customized Decision Support Matrix (DSM). The DSM is an analytical tool that compares companies’ performance relative to each other with an integration of quantitative and qualitative metrics. The DSM features criteria unique to each award category and ranks importance by assigning weights to each criterion. The relative weighting reflects current market conditions and illustrates the associated importance of each criterion according to Frost & Sullivan. Fundamentally, each DSM is distinct for each market and award category. The DSM allows our research and consulting teams to objectively analyze each company’s performance on each criterion relative to its top competitors and assign performance ratings on that basis. The DSM follows a 10-point scale that allows for nuances in performance evaluation; ratings guidelines are shown in Chart 2.

Chart 2: Performance-based Ratings for Decision Support Matrix



This exercise encompasses all criteria, leading to a weighted average ranking of each company. Researchers can then easily identify the company with the highest ranking. As a final step, the research team confirms the veracity of the model by ensuring that small changes to the ratings for a specific criterion do not lead to a significant change in the overall relative rankings of the companies.

Chart 3: Frost & Sullivan’s 10 Step Process for Identifying Award-Recipients



Best Practice Award Analysis for Semprus BioSciences (Cambridge, Massachusetts)

The Decision Support Matrix, shown in Chart 4, illustrates the relative importance of each criterion for the Enabling Technology Award and the ratings for each company under evaluation. To remain unbiased while also protecting the interests of the other organizations reviewed, we have chosen to refer to the other key players as Competitor 1 and Competitor 2.

Chart 4: Decision Support Matrix for Enabling Technology Award

<i>Measurement of 1-10 (1 = lowest; 10 = highest)</i>	Award Criteria					
	Enables Creation of New Products	Enhances Current Products	Enables New Applications	Potential for Market Acceptance		Weighted Rating
Relative Weight (%)	25%	25%	25%	25%		100%
Semprus BioSciences	8	8.5	8.5	8		8.25
Competitor 1	7.5	7	8	7		7.37
Competitor 2	7.5	7.5	7.5	6		7.12

Criterion 1: Enables Creation of New Products

Semprus BioSciences is actively involved in developing novel and multi-faceted approaches aimed at solving complications associated with implanted medical devices. The firm’s goal, through its Semprus Surfaces platform, is to achieve control of the interfaces between the body and a medical device to best address the root cause of adverse reactions to foreign implanted materials. The Semprus Surfaces technology platform mimics the chemical properties of endothelial cell membranes, thereby minimizing foreign body responses to an implanted device, which often contributes towards inflammatory reactions occurring in the body.

Criterion 2: Enhances Current Products

Semprus Surfaces platform has been initially designed to maximize stability and prevent potential degradation through hydrolysis, oxidative stresses, enzymolysis, or any other forms of mechanical abrasion. The durability features of the Semprus Surfaces technology platform, when combined with the potential to provide prolonged activity, make it a highly preferable tool for permanent implants. The Semprus Surfaces technology platform has been shown to be biocompatible, which could provide an excellent platform for the

incorporation of immobilized or leaching active agents to tailor desired biological functionality. Moreover, by preventing the accumulation of biological materials on the surface, Semprus BioSciences unique technology platform helps active agents achieve their desired functionality without the risk of deactivation.

Criterion 3: Enables New Applications

The Semprus Surfaces platform is able to adapt to diverse substrates, such as polyurethane, silicone, and titanium, thus paving the way for next-generation products with improved clinical benefits across the medical spectrum. The versatility of this technology creates avenues to address multiple products ranging from orthopedics to hernia meshes, to cardiac rhythm management devices involving pacemakers and many others. When it comes to orthopedic applications, the technology is able to incorporate active agents to assist in bone in-growth, which could improve implant integration overall. Moreover, the platform's ability to apply its core technology to titanium offers a novel approach to preventing infections associated with these chronic devices that require long-term activity. Furthermore, as a means of preventing infection, the incorporation of Semprus Surfaces technology has been demonstrated to directly address biofilm formations on the mesh devices commonly used for hernia repair. Once again, Semprus Surfaces multi-functional technology offers a potential solution to several complications arising due to infections associated with cardiac rhythm management devices by using a single surface modification platform.

Criterion 4: Potential for Market Acceptance

Since its inception, the Semprus Surfaces technology platform has been custom-designed for vascular applications such as catheters. This non-leaching technology is designed to endure the lifespan of the device while at the same time reducing device-related thrombus and bacterial biofilm formation. The customized vascular chemistry feature of the Semprus Surfaces platform has been tailored to address the practical and manufacturing considerations of vascular catheters. In order to expedite its product development, Semprus BioSciences has structured the application process to prevent any measurable impact on the underlying mechanical or dimensional properties of existing devices.

Funding

In December 2008, Semprus BioSciences completed an \$8 million Series A Financing co-led by 5AM Ventures and Pangaea Ventures. This funding contributed towards the \$2.5 million seed capital raised in the year 2007. Semprus BioSciences has been able to secure global licenses from the Massachusetts Institute of Technology and the University of Washington, and holds numerous proprietary intellectual property filings. Apart from the good funding support received from 5AM and Pangaea ventures, Semprus BioSciences has secured additional funding from the Department of Defense, National Institutes of Health, and the National Science Foundation over the years. The company has recently received a \$500,000 Phase II-B Grant from the National Science Foundation.

Conclusion

Frost & Sullivan's independent technology research can confirm that Semprus BioSciences' unique technology platform is the first non-leaching single surface modification that can simultaneously reduce bacterial growth and thrombus formation (blood clots) on medical devices with multi-month efficacy.

Based on Frost & Sullivan's 3rd party analysis of surface functionalization technologies adopted to address medical device infection control, Semprus BioSciences is being recognized with the 2010 North American Enabling Technology of the Year Award.

The CEO 360-Degree Perspective™ - Visionary Platform for Growth Strategies

The CEO 360-Degree Perspective model provides a clear illustration of the complex business universe in which CEOs and their management teams live today. It represents the foundation of Frost & Sullivan's global research organization and provides the basis on which companies can gain a visionary and strategic understanding of the market. The 360-Degree perspective is also a "must-have" requirement for the identification and analysis of best-practice performance by industry leaders.

The 360-Degree model enables our clients to gain a comprehensive, action-oriented understanding of market evolution and its implications for their companies' growth strategies. As illustrated in Chart 5 below, the following six-step process outlines how our researchers and consultants embed the 360-Degree perspective into their analyses and recommendations:

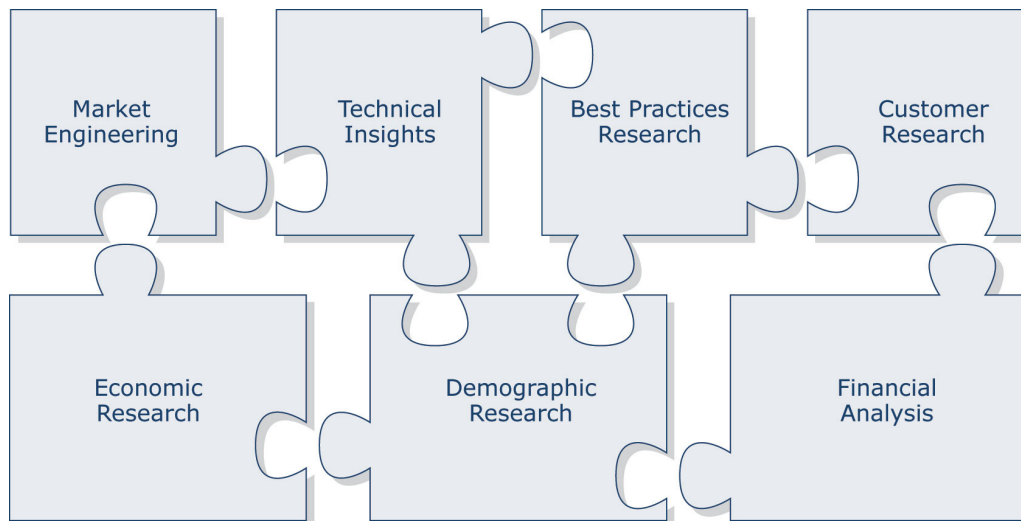
Chart 5: How the CEO's 360-Degree Perspective Model Directs Our Research



Critical Importance of TEAM Research

Frost & Sullivan's TEAM Research methodology represents the analytical rigor of our research process: it offers a 360-Degree view of industry challenges, trends, and issues by integrating all 7 of Frost & Sullivan's research methodologies. Our experience has shown over the years that companies too often make important growth decisions based on a narrow understanding of their environment, leading to errors of both omission and commission. Frost & Sullivan contends that the successful growth strategies are founded on a thorough understanding of market, technical, economic, financial, customer, best practices and demographic analyses. In that vein, the letters T, E, A and M reflect our core technical, economic, applied (financial and best practices) and market analyses. The integration of these research disciplines into the TEAM Research methodology provides an evaluation platform for benchmarking industry players and for creating high-potential growth strategies for our clients.

Chart 6: Benchmarking Performance with TEAM Research



About Frost & Sullivan

Frost & Sullivan, the Growth Partnership Company, enables clients to accelerate growth and achieve best in class positions in growth, innovation and leadership. The company's Growth Partnership Service provides the CEO and the CEO's Growth Team with disciplined research and best practice models to drive the generation, evaluation and implementation of powerful growth strategies. Frost & Sullivan leverages almost 50 years of experience in partnering with Global 1000 companies, emerging businesses and the investment community from 31 offices on six continents. To join our Growth Partnership, please visit <http://www.frost.com>.