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Consultants in Advanced Materials

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## **Selection of Technology Assessment Related Projects**

### **Assessment of nanotechnologies for medical applications**

Our client is a leading professional dental supply company. In order to evaluate a potential growth opportunity, the client asked us to identify a variety of technology areas within the scope of nanotechnology having medical target applications. We performed a high-level technology scan that yielded a number of suitable technology platforms, relevant medical applications and information concerning the leading developers of each technology, i.e. companies, universities or research labs.

### **High frequency power generators: technology scan to identify leading technology**

Our client is a global leader in its field of business. For a future equipment design that the company was developing our client wanted to employ very high frequency power generators for induction heating, which had to meet a number of specific performance and operating criteria. Our objective was to assess the potential availability of such commercial high frequency power generators and/or the possibility of developing equipment that met these specific criteria. Our ability to keep the client's name and ultimate end-use application confidential was important in this study. We identified a short list of companies that could offer power generators with the requisite functionality and we further assessed the specific suitability for our client's application.

### **Assessment of cost effective materials technologies for weight reduction of complex automotive product**

Our client is a leading global manufacturer of a critical automotive product. The objective of the project was to identify technologies that enabled cost effective weight reduction of the complex product. We identified a number of technologies for the various components of the product, such as polymer foam composites; specific enabling manufacturing processes; and also weight reduction via novel, high specific strength steel and aluminum technologies.

### **Assesment of emerging manufacturing technologies**

Our client is a leading automotive parts manufacturer whose R&D group was looking to identify novel and revolutionary manufacturing technologies that they had not you identified internally for longer term development. An underlying motivation for this study was the ongoing trend toward more demanding tolerances for many new products. We provided an overview of cutting edge manufacturing technologies, which would still be categorized as being in the conventional domain and supplemented this with an assessment of more futuristic nanotechnology related manufacturing.



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### **Assessment of energy storage technologies for security applications**

A leading manufacturer of security actuator devices is facing growing competition from emerging energy storage technologies, which have the potential of replacing established technologies at a much more competitive price. In line with the objectives of our client to focus on quality and performance we executed a global assessment study on development trends in the field of energy storage. We qualified these according to different criteria including very stringent operating conditions, compactness and operational safety. This study has led to the identification of an outstanding emerging technology solution, for which our client has now initiated an R&D program, as well as shorter term alternative solutions such as special supercapacitor designs.

### **Assessment of RFID and other printed electronic technologies**

In the hectic development environment of printed electronics, a leading packaging industry assigned us the mission to assess and rank developed and emerging materials and processes in terms of application potentials towards barcode replacement, including RFID. The study revealed some key strategic information related the near, medium and long term potential of the different players with a strategic roadmap enabling our client to move forward with further developments and implementation programs.

### **Assessment of state-of-the-art and future developments microreactor technologies**

Our client was considering entering the market of microreactors by adopting a developing technology based on its current material strengths. We assessed the technology and evaluated applications with significant advantages compared to conventional batch reaction systems. We provided an evaluation of the current microreactor manufacturing technologies linked to potential valuable partners, roadmaps for possible system developments, and market predictions in selected areas.

### **Evaluation of specialty polymer technology**

Our client was interested in understanding the current state-of-the-art in non-petrochemical based polymers as well as understanding the technology and economic drivers for future development in the area. Specifically, they were interested in understanding the impact of current and future price of oil on the development and adoption of the new technology. We evaluated all current global producers of non-petroleum based polymer technology and estimated the timeline for future development while providing an analysis of the impact of the oil price on the replacement potential of these non-petrochemical polymers to conventional polyolefins.

### **Technology and market assessment of materials technology for Lithium-polymer batteries**

A client had developed a technology that showed early stage promise for Li polymer battery manufacturing. We provided a comprehensive assessment of the potential market and technology trends relating to Li polymer batteries in relation to the more established Li-ion technology. This included assessing performance drivers for three critical potential

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end use market segments and whether the client's technology could enable the use of Li polymer batteries in these end-use applications. In the course of the study we identified key trends and alternate technologies that could influence potential market interest in our client's technology. The study also examined technology trends in printed batteries, which is a subset of printed electronics, also in order to understand if our client's technology could potentially spur development in this emerging market.

**New developments in charging technologies**

We conducted a survey of various charging technologies and evaluated their potential to threaten the traditional battery industry by making battery charging unobtrusive. For each potential new technology, we evaluated the main technological hurdles to development, and the cost and time frame for development. We also identified key developers of the new technologies.

**Assessment of a fuel cell technology**

Our client was currently not active in the fuel cell area but was considering entering the market by adopting a developing technology that had the potential of making hydrogen fuel cells commercially viable for portable electronics and other applications. We assessed this new technology and evaluated key companies in this area. We provided an evaluation of the technology in terms of technical and commercial hurdles. We also provided cost estimates and comparisons with other fuel cell technologies.

**Assessment of metallurgical assembling techniques**

A company holding some leading IP's in assembly mechanisms assigned us the mission of identifying and analyzing potential future innovative approaches for their needs. Some of the focused criteria included rigorous biocompatibility. The study has enabled a comprehensive analysis of emerging technologies with potential future options, as well as the description of an innovative solution with key IP option pursued by the client.

**Joint reconstruction and biocompatibility**

An orthopedic joint reconstruction company assigned us the mission of providing an independent survey of clinical trends, technological analysis and IP situation. The focus has been on a specific issue related to implant bearings and biocompatibility. We were able to rapidly penetrate relevant matters including patent analysis, identify key players and deliver a comprehensive analysis of the situation which helped out client refocus their efforts and define future investment.

**Assessment of filtration technologies**

In order to evaluate a potential growth opportunity, a client asked us for an assessment of common household filtration technologies for drinking water. We analyzed the various filtration methods used in commercial systems in terms of technological merit as well as



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cost analysis, while also providing competitive analysis and drivers/barriers to entry. The report helped the client in making a business decision whether or not to enter this new market.

**Assessment of testing procedures and technologies related to human physiology**

As a follow-up on a previous study related to health related testing procedures, we extended the analysis to other physiological changes occurring in the human body with emphasis on chemical changes that can be detected in a quantifiable manner. We also explored various detection technologies than can be used by our client for extending their product offering into the testing area.

**Assessing metallurgical material innovations and trends**

We provided a targeted comprehensive study and analysis of metallurgical development trends and recent achievements. Several identified product development opportunities were subsequently recognized and incorporated in their strategic R&D decision-making process. We emphasized the growing importance of nanotechnology in metallurgy with nanophase, nanocrystalline and amorphous based products.

**Active matrix driving circuit substrates**

A client in the field of active matrix driving circuits for small to medium size displays was confronted with an uncertain transition from one leading technology to another while facing emerging new technologies. We provided a technology assessment that highlighted the trade-off between these technologies while keeping track of market factors and impact expectations.

**Large area flat panel televisions**

In order to position their investment strategies, a client assigned us the mission to assess the future of advanced materials in the field of large area flat panel displays for televisions. We assessed tradeoffs between ongoing processing breakthroughs in mature technologies versus emerging new materials and processes. Market data gathering completed the study to assist the decision-making process.

**Rapid charging technologies for secondary batteries**

We searched for commercially available charging technologies that would reduce the charging time by more than half the current time. We assessed the available rapid charging technologies for performance, cycle life and safety and provided recommendations on the most suitable technologies. We looked at technologies related to both the charger and the battery that could improve the charging efficiency. We also provided recommendations on improving the battery chemistry and design that would improve battery charging efficiency.

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Our client had unexpectedly detected very small corrosion rates at room temperature in specific refractory alloys. To prevent them from exposing their ideas and application trends for such refractory alloys to the competition, we identified a set of experts with whom they could potentially collaborate. We also provided our client with a complete technology assessment of potential key issues and solutions relating to this corrosion phenomenon.

**Catalyst system for polymerization**

A client has a unique catalyst system and we embarked on our second project relating to this technology in order to determine whether it could be applied to polymerization reactions. We outlined the broad based fundamentals of polymerization catalysis and the associated marked segmentation. We pinpointed areas where our client's technology could be applied. Our analysis provided the basis for our client's pending decision whether to pursue the polymerization segment.

**Opto-electronics crystals**

For a major opto-electronics component manufacturer, we evaluated new crystal materials technologies and markets. Our client was evaluating cost and strategic advantages associated with deciding to make the component in-house or to buy from existing suppliers. We provided an evaluation of availability to acquire necessary technology and possibilities for operating competitive manufacturing and market prospects.

**Wide bandgap SiC technology**

We analyzed scientific progress and commercial development of wide bandgap SiC for power electronics, RF and other applications. We made our client aware of a new technology for manufacturing lower cost SiC wafers. We were then asked to analyze the potential applications of SiC devices as well as the viability of this new SiC wafer technology. We had in-depth discussions with the inventor of the new technology and interviewed experts in industry & academia in order to aid us in evaluating the validity of the inventor's claims.

**Electrochemical sensors**

We conducted an exploratory survey of electrochemical sensors used in the detection of household hazards such as carbon monoxide. We evaluated the current state of electrochemical sensors and surveying various technologies available for the detection of common pollutants. Information sources include company literature, patent databases, academic and industry, government agencies and environmental protection groups.

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A client was interested in understanding the latest developments in the area of nanotechnology. The focus of this work was on nanomaterials for energy storage applications, but we also provided a broad overview of the field. This project dates from before having employed an analyst at our company who is an expert in this particular field.

**Assessing new developments in nanotechnology for a minerals company**

Our client was a producer of mineral particulate processed from ores. Their interest was to better understand new processes and methods for making nano sized particulate and the properties of the nanomaterials produced. Taking advantage of such new technologies would potentially give our client major product improvements and subsequent competitive advantages.

**Materials technology trends in electronic packaging**

The market landscape for electronic packages is changing due to the dramatic growth in wireless communications. For a leader in metal packaging and metal to glass seals, we analyzed the market trends of metal and ceramic packages and identified the most promising packaging technology to pursue from a list of candidates. The methodology included extensive discussions with existing customers with our clients, discussions with industry experts, and literature reviews.

**Search for and evaluation of printed polymer transistor technology**

A client was interested in incorporating low-cost, simple electronics on its packaging labels: printed polymer transistors. We researched the development of this technology at industry research labs and academia. We also examined potential low-cost processing routes for the technology.

**Assessing advanced materials technology for medical application: threat or opportunity?**

A client has a dominant position in supplying OEMs in the medical equipment industry with a key mechanical component. Other firms have been developing solid-state equipment based on advanced materials. The question was whether our client should become proactive and become involved in the new technology in order to protect its position as the key supplier to this industry segment. We searched for and identified additional firms that were involved in developing various types of solid-state technologies. We analyzed the technology of each company or research group to determine if it had the potential to operate efficiently and reliably, and to be manufactured at a competitive cost. In this process we provided an assessment of the timeframe of the time to commercialization.



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**Analysis of low-cost polymer systems for substrate application**

A client had developed a low-cost polymer system for manufacturing a so-called substrate that is used in its products. We performed broad-based analysis of alternative systems that largely rely on recycled polymer materials. We looked for both thermoplastic and thermoset based systems that met a detailed list of properties. We generated a detailed list of polymer systems that considered materials properties, raw material cost, capital equipment cost and processing cost. We also considered the availability of recycled raw materials. Thus, we provided our client with estimated costs for our suggested systems, which enabled head-to-head comparison with the system that our client had already developed.

**Microbatteries**

We evaluated the state of microbattery research for a client interested in developing microbatteries for electronic applications. We provided an overview of commercially available products and investigated cutting edge research in this area at various universities, research and defense related organizations on a global scale. We evaluated different technologies and identified the most suitable one for our client. We also identified licensing opportunities for our client.