OUNano Inc.
BUSINESS PLAN

TABLE OF CONTENTS

1.0 THE COMPANY

OUNano, Inc. was formed in January, 2004 with a plan to develop, manufacture and market single-walled carbon nanotubes. The company is a young enterprise, currently in the beginning stages of development. Preliminary analysis projects the company to be highly profitable and to meet the demands of an ever-increasing market. The organization will be composed of highly qualified personnel at all levels. Employees will possess a strong commitment to the field of nanotechnology and the researchers who continue to expand it. The company is confident in its ability to produce high quality single wall carbon nanotubes, and to establish itself as a leader in the nanotubes sector.

1.1 Objectives

Long-term objectives for our company are to establish a strong client base and to become a recognized leader in the manufacture of carbon nanotubes. Short-term goals include securing funding for the construction of our facility, and completing a preliminary marketing and advertising campaign

1.2 History

The company is the idea of three chemical engineering graduates from the University of Oklahoma. The company is currently seeking an investor to back the enterprise. The high demand for single-wall carbon nanotubes is the basis for the plant. Utilizing a gas phase process similar to the HiPCO process developed by Richard Smalley at Rice University, the facility will be able to produce nanotubes on a large scale. The enterprise is expected to be highly profitable, capturing a considerable share of the market.

1.3 Organization

The proposed manufacturing facility will employ approximately twenty people, including equipment technicians, operators, supervisors, management, marketing, and customer service representatives. When funding is secured and construction on the new facility is underway, the hiring process for a majority of these positions will begin. Employees will receive two weeks of vacation each year, as well as ten holidays. In addition, all employees will be provided with medical and dental insurance and a retirement plan with stock options. Because of our small size, the company will be able to be highly selective in our choice of personnel. This will allow the company to maintain a high standard of competence. The organization chart below summarizes the key personnel of the company:

Key Personnel

Dr. Miguel Bagajewicz, a professor at the University of Oklahoma, has two positions as Samuel Roberts Noble Foundation Presidential Professor and as Director of the Center for Engineering Optimization. He will be the president of the company. His extensive experience in design, operation, and optimization of process plants make him an excellent choice for the company president.

Sabrina Pepper is a recent graduate of the University of Oklahoma. She possesses a bachelor's degree in chemical engineering. Her past work experience includes working at the Oklahoma Medical Research Foundation in the crystallography department, where she conducted research on the crystallization of antibodies. As one of the founders of the company, Ms. Pepper will act as the chief executive officer for the company.

Linh Do also received a bachelor's degree in chemical engineering from the University of Oklahoma. Ms. Do is a member of the Applied Surfactant Research Center. She has three years of experience in the surfactant field. Ms. Do will hold the position of Chief Development Engineer, and will be responsible for improvements and alterations to the synthesis process used in the facility.

Ilze Veideman, also a chemical, engineering graduate from the University of Oklahoma, is the third founder of the company. She has done undergraduate research on the electrical properties of carbon nanotubes. Ms. Veideman will serve as Vice President of Marketing.

PERSONNEL COUNT

Engineering/Development	
Management	2
Non-management	4
Production/Service Delivery	
Management	2
Non-management	4
Marketing	
Management	1
Non-management	2
Sales/ Customer Support	
Management	1
Non-management	3
General & Administrative	
Management	1
Non-management	2
Total Personnel	**22**

1.4 Operations

At the present time, our company is seeking to secure funding for a new facility. Construction and engineering for the new building will be sub-contracted. Preliminary cost estimates for the plant have been performed, and will be presented in the finance section.

Once completed, the facility will produce purified single-walled carbon nanotube through a gas phase process. The process is a commercial-scale version of the patented HiPCO process. Licensing and royalties will be paid to Richard Smalley for the use of the technology. While the prototype has yet to be built, the design and specifications of the product are substantially complete.

1.5 Future

The future of the company largely depends on the state of the market and the development of new nanotube-related technologies. As more large-scale production methods are developed for carbon nanotubes, our facility may consider adjusting its production rate and pricing. In addition, as new applications for nanotubes become commercially promising, the increased demand for nanotubes may prompt the expansion of our plant.

2.0 THE MARKET

Most of the applications for single wall nanotubes are currently in development. At present, 90% of the potential market lies in academic and industrial research laboratories. Our plant will produce un-functionalized single wall nanotubes, which we will sell to clients that wish to use the product as is or to perform their own chemical processing.

2.1 Objectives

The current prospective for our product are mainly research and development laboratories in the academic and industrial sectors. Their objectives are mainly to improve the viability of various applications of carbon nanotubes and to discover new applications. Prospective buyers for our product will want unprocessed carbon nanotubes that they can modify in their own laboratories. Prospects will want to purchase our product because of our ability to sell in large quantities. As new applications become ready for commercial implementation, the market for our product will expand significantly.

2.2 Segmentation

We expect the market for nanotubes to be quite diverse, as it is beneficial to a wide number of applications. Most of the smaller segments of the market are not yet fully developed. We plan to focus on more specific market segments for the first one to two years while applications in other segments develop. Due to the unprocessed nature of our product, the majority of our prospects will be academic and industrial research laboratories.

2.3 Size

Nanotubes are the fastest growing sector of the nanotechnology market, with a projected average annual growth rate of 173% over the next five years.[i] Market research estimates

indicate that the global production of nanotubes in 2003 was between 4 to 10 kg. Prices of high quality nanotubes range from $200 to $1000 per gram. By one estimate, the carbon nanotube market was valued at approximately $12 million in 2002.

2.4 Environment

The trend towards increased government spending on nanotechnology research and development should speed up the development of commercial applications. As the number of applications increases, the demand for nanotubes will also increase in those segments

3.0 THE OFFERINGS

The pricing for our products will initially be about $500/gram. This price is the average price of our competitors. Our product will have a medium to high level of purity, allowing it to compete easily with that of our competitors. The large demand for nanotubes should provide easy entry into the market and allow us to secure a stronghold in the market.

3.1 Description

Our company plans to offer single wall carbon nanotubes produced from a commercial scale gas phase synthesis process. The technology will be licensed from Richard Smalley of Rice University, who developed the HiPCO process that our synthesis is based upon. In this process, a mixture of carbon monoxide gas and iron pentacarbonyl will be injected into the reactor along with a stream of pure carbon monoxide. The reactor will be kept at high temperature and pressure, around 1050^{o} C and 30 atm. A detailed description of the process and reaction can be found in the technical document that accompanies this business plan.

3.2 Status

The production facility is in the planning stage of development. Preliminary design and planning has been completed for the process. Necessary funding for the venture is expected to be secured by the beginning of next year. Construction of the facility will begin soon after, and should last around six months. This does not include the installation of the equipment, piping, and instrumentation, which will take additional time. The projected date for beginning production is set for June of 2006.

3.3 Value

The single wall nanotubes produced in our facility will appeal mainly to industrial and academic laboratory researchers. Since the nanotubes will be sold in an essentially unprocessed form, customers will be able to perform their own processing methods to mold the nanotubes to their own specifications. Since the cost to produce the nanotubes is considerably less than the current market price, the venture should be highly profitable.

3.4 Cost to Produce

Component	Basis for Estimate	Cost ($/yr)
I. Manufacturing cost		
A. Direct production costs		
1. Raw materials		
$Fe(CO)_5$		$ 209
CO	Commercial Grade	$ 177
Argon	liquid (230 psi)	$ 393,300
Filter Paper	Millipore (Grade 102) 3μm pore	$ 500
Filter Paper	Cole-Parmer 1μm pore	$ 1,500
	Subtotal:	***$ 395,686***
2. Operating labor		$ 2,000,000
3. Direct supervisory and clerical	15% of operating labor	$ 300,000
4. Utilities		$ 2,589,499
5. Maintenance and repair	6% of FCI	108256.5609
6. Operating supplies	15% of maintenance and repair	$ 5,611
7. Laboratory charges	15% of operating labor	$ 52,560
8. Patents and royalties	15% of total product cost	$ 860,758
	Variable cost	***$ 5,916,685***
B. Fixed charges		
1. Capital costs		
Property taxes	2% of FCI	$ 36,086
Insurance	1% of FCI	$ 18,043
sub-total		***$ 54,128***
C. Overhead costs	60% of labor & supervision	***$ 1,380,000***
II. General expenses		
A. Administration costs	20% of labor & supervision	$ 88,074
B. Distribution and selling costs	5% of total product cost	$ 286,919
C. Research and development	10% of total product cost	$ 573,839
sub-total		***$ 948,832***
Total annual product cost		$ 8,695,331
	Unit cost ($/gram)	**$ 23.82**

3.5 Support

Customer support is not expected to be a significant requirement for our product. All customer relations issues will be directed to the sales staff. Sales representatives will be highly knowledgeable in regards to the product properties and synthesis process, and will therefore be able to answer questions or troubleshoot problems that customers may have.

4.0 MARKETING STRATEGY

The goal of our company is to secure a strong share of the nanotubes market. The intent is to use a moderately aggressive market penetration pricing strategy combined with a pull promotion strategy. We will price our product slightly below the average of competitive nanotube prices during the first several years to achieve a significant market portion.

4.1 Targets

The main targets for our product will initially be academic and industrial research labs. Due to the increase in government funding for nanotechnology research and development, researchers will have the ability to purchase more nanotubes for experiments. Our product will also be marketed to composites manufacturers that can utilize the unprocessed form of single wall nanotubes. As more applications emerge, the market for our product will expand.

4.2 Corporate Image

The objective of our company is to establish a reputation as a leader in the nanotubes industry. In order to achieve this image, we will maintain a commitment to high quality products and service.

4.3 Promotion

A "PULL" strategy will be employed to promote our product. A major commitment will be made to advertising our product in the chosen sectors. Publicity from selected nanotechnology business conferences and media events will accompany the advertising campaign.

Product Image

We want our products to be perceived at two levels: by researchers and by industrial companies that will use our components. We want companies to base their perception on the relationship we will establish with them through our sales and delivery organizations. It is also influenced by how their customers accept the products made with our nanotubes. The researchers will base their opinion on the price and quality of our nanotubes. At both levels, our product image goal is one of "top of the line" in both quality and price.

We expect quite a bit of publicity for our company. We plan to speak at a number of nanotechnology and business conferences. Press releases will also be sent to major news agencies and a number of nanotechnology publications.

Advertising
Advertising for our new company will help our company compete in the nanotubes market. Advertisements will be purchased in nanotechnology publications such as *Small Times.* Our focus will center on the academic research sector. Information about our product may also be sent out by mail to research institutions.

4.4 Pricing
We intend to price our nanotubes around the average pricing of the competition in order to capture as much market share as possible. Pricing our product at $500/gram will make us a considerable profit since the product cost is just under $16/gram. Because competitors have so much marketing strength, we may switch to a more aggressive pricing strategy and lower the selling price to gain a stronger hold on the market.

4.5 Sales
Sales representatives employed by our company will be highly trained and knowledgeable about our product. They will be able to answer any questions regarding the properties of our nanotubes. Our product will be available for order by phone or through our website.

4.7 Logistics
The nanotubes product will be packaged and shipped directly from our manufacturing facility. Since most orders will be in small quantities, perhaps several grams, transportation costs will not be an important factor. Purified nanotubes will be compressed into small pellets, weighed, and placed in plastic jars. Orders will be shipped by mail in small boxes, and should arrive within 3-5 business days. We plan to use UPS delivery service to deliver our product to the customers. This way, customers may choose the option of rush delivery at an additional charge. This arrangement will place the cost of shipping onto the customer.

4.8 Support
Our nanotubes product will come with a property specification guarantee. Any orders that do not meet these specifications may be returned for a full refund or exchange. All returns will be handled by our shipping department. Sales representatives will be in charge of customer support.

5.0 COMPETITIVE ANALYSIS

Currently, there are sixteen nanotube producers worldwide, half are in the U.S.

Company	Synthesis Method	Purity (%)	Price ($/g)
Carbolex	Arc Discharge	70 - 90	60 -100
Carbon Solutions Inc.	Arc Discharge	60-80 70 - 90	250 400
CNI	HiPCO	>90 Fluorinated	500 900
IIJIN	CVD & Arc Discharge	SWNT	60-200
MER	Arc Discharge	10 - 40	80
Nanocarblab	Arc Discharge	40-90	100
Nanolab	CVD	90	200 - 400
Nanostructured & Amorphous Matereials	CVD	>90	200
SweNT Inc.	CoMoCat	>90	500

6.0 OPERATIONS / PRODUCTION

The manufacturing operation is the "backbone" of our company. The process of synthesizing carbon nanotubes is continuous. The operation will be managed by very experienced individuals, using state of the art equipment and employing intelligent, and also highly experienced, personnel. Because some aspects of the operation are unique, the only way the personnel can get the necessary experience is for us to train them. Our hiring policies and education techniques will continue to grow as the company expands and changes. Our planned facilities and equipment will be operated at full capacity for the first few years. Projected growth will be continuously analyzed as the market continues to grow.

6.1 Organization

We currently plan to hire around 6 employees for the production and delivery sections of our company. Most of the necessary workers will be hired from the local area. Personnel will be required to possess a high level of experience and training. Equipment operators will need to be familiar with the reactor and the synthesis process. The manufacturing process requires that two of these operators be available at all times.

6.2 Suppliers

We have not yet selected the definitive suppliers for our process. However, the raw materials needed are all common chemicals and could be purchased from a number of different supply companies. We expect to have all suppliers selected before construction on the plant is complete.

6.3 Technology
The manufacturing technology that will be used in our plant is the patented HiPCO process. Licensing rights will be secured before production begins.

6.4 Quality
The quality and composition of our product will be analyzed before selling. The nanotubes are all guaranteed to a specified purity, so we will take considerable precautions to ensure that those tolerances are met. Approximately 10% to 15% of each day's batch will be checked to specifications. If more than 5% of those are rejected, the whole batch will be checked.

7.0 FUNDING REQUIREMENT
Our company is currently seeking an equity investment of $2,500,000 for the start-up of the enterprise. The investment will be used to fund the preliminary stages of the company's development.

7.1 Use of funds
An estimated $2.5 million will be used for the construction of the new facility. This will include the purchase of land and the construction of the facility, as well as the equipment and installation costs. The table below shows the breakdown of direct and indirect costs projected for the new facility. A portion of the investment will be used for preliminary advertising and promotion of the company's product. Additional funds will be used for the executive's salaries.

7.2 Investor Involvement
We are proposing that this be an equity investment for which the investors will receive 15% ownership in the company. Management will provide a seat on the company's board of directors. Ongoing reports of key ratios, profit-loss statements, balance sheets, and annual audits would be provided to the investor. It is management's intent that the investor will enjoy returns on investment in excess of that of alternative investments, as a privately held company, while providing investor liquidity of his investment by taking the company public at its earliest opportunity.

Table 1 Estimated Total Capital Investment

Component	Basis for Estimate	$
Direct Cost		
Onsite		
Purchased Equipment:		
Reactor		$25,050.00
Compressor		$60,000.00
Molecular Sieve		$10,000.00
Nanotube filter		$1,300.00
Vacuum Oven	Cole-Parmer: electronic control, 0.67 ft^3	$2,700.00
Furnace	Cole Parmer 800W	$2,000.00
Vacuum Pump		$500.00
Ultrasonic processor	Cole-Parmer: 1500 W, 10 L cap. (100L/h)	$7,940.00
Total purchased equipment		*$109,490.00*
delivered equipment	10% of purchased cost	$23,923.50
pruchased equiment installation	*Subtotal: delivered equipment*	$63,796.00
instrumentation$Controls(installed)	47% of delivered equipment	$95,694.00
Piping(isntalled)	36% of delivered equipment	$49,441.90
Electrical systems(installed)	68% of delivered equipment	$39,872.50
Buildings(land and constructions)	11% of delivered equipment	$639,593.50
Yard improvements	18% of delivered equipment	$39,872.50
Service facilities	10% of delivered equipment	$87,719.50
Total Direct Cost		$1,207,343.40
Engineering and supervision		$25,000.00
Construction expenses		$250,000.00
Legal expenses		$9,170.68
Contractor's fee		$150,000.00
Contingency		$80,701.94
Advertising		$10,000.00
Marketing		$5,000.00
Total Indirect Cost		**$529,872.62**
Fixed Capital Investment		**$1,737,216.02**
Working Capital	15% of TCI	**$306,567.53**
Total Capital Investment		**$2,043,783.55**

References

[i] *Nanotechnology: A Realistic Market Evaluation.* GB-290. Business Communications Company. February 2004.