

US Industry Study

with forecasts to 2008, 2013 & 2020

Study # 1838

August 2004

\$4200

# Nanotech Tools

## Formative US market to skyrocket through 2008

The US market for nanotech tools is projected to increase nearly 30 percent per year through 2008 to \$900 million, and then triple again to \$2.7 billion in 2013. Nanotech tools represent a key segment of the emerging nanotechnology business, allowing for the visualization, measurement, fabrication, manipulation, production, simulation and testing of matter in the nanoscale range -- approximately 0.1-100 nanometers.

## Nanoscale visualization tools dominant type

Four basic types of nanotech tools are available -- visualization tools, primarily scanning probe and electron microscopes; measurement (or metrology) tools, including spectroscopic and optics-based; fabrication/production tools, including nanomanipulators and nanolithographic devices; and simulation/modeling tools, which aid in the design and development of nanotechnology products.

To this point, visualization tools -- and scanning probe



microscopes in particular -- have accounted for a sizeable majority of the aggregate nanotech tools market. In the future, measurement, fabrication/production and simulation/modeling tools will register faster growth, reflecting both upgrades in the capabilities of these types of tools, and the increasingly sophisticated requirements of nanotechnology product manufacturers.

## Electronics, life sciences hold best short-term promise

As of 2003-2004, about three-quarters of commercial nanotech tools demand was accounted for by basic

research applications in public sector, university, research institute and private sector laboratory settings. As markets for nanotechnology products steadily develop, demand for nanotech tools will shift away from basic research toward applied research and product development activity in such industries as electronics (especially semiconductor fabrication) and the life sciences (pharmaceuticals, medical devices, biotechnology, etc.). Other potentially large-scale markets -- in the industrial, aerospace/defense, motor vehicle, energy generation, construction and other sectors -- are expected to develop over a longer period.

## Formative industry features companies of all sizes

Somewhat fewer than 100 private sector players were believed to be active in the US nanotech tool business as of the early years of the new millennium, compared to the approximately 500-1,000 firms that participate in the nanotechnology sector as a whole (mostly through R&D programs). As would be expected, the nanotech tools industry is in the formative stages, featuring a large number of small, research-oriented start-up-type companies, as well as various larger corporate entities.

## Study coverage

**Nanotech Tools**, a 201-page Freedonia industry study, is priced at \$4200. It provides historical US demand data for 2000 and 2003 plus forecasts to 2008, 2013 and 2020 by nanotech tool type and by application. The study also evaluates market shares and profiles key industry competitors.

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each table includes forecasts through 2008 & 2013

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### INDUSTRY STRUCTURE

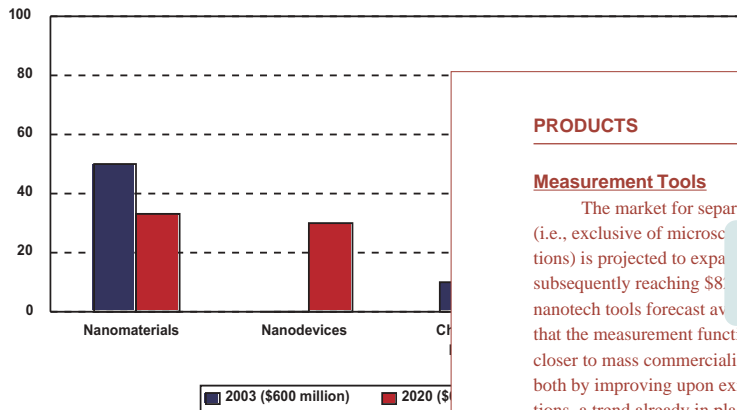
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# Industry Study #1838 - "Nanotech Tools"

CHART III-1

US NANOTECHNOLOGY MARKET BY MAJOR PRODUCT TYPE, 2003 & 2020 (percent of total)



## PRODUCTS

### Measurement Tools

The market for separately sold and dedicated nanotech measurement tools (i.e., exclusive of microscopes) is projected to expand subsequently reaching \$8 billion by 2020. The nanotech tools forecast anticipates that the measurement function will attain as nanotechnology products move closer to mass commercialization. Tool suppliers will respond to these needs, both by improving upon existing designs and introducing completely new solutions, a trend already in place.

Explanations to support each table's data and projections

Measurement, or metrology, tools are critical to the development of nanotechnology materials, devices and other products, although as of the early years of the new millennium the market for dedicated metrology tools was relatively large. This reflects, in part, the extensive use of high-resolution systems such as scanning probe microscope systems at the nanoscale level. Most nanotech measurement tools developed and utilized to date are based on electronic instruments that have been optimized for nanoscale metrology, spectroscopy, scattering, etc., as well as various other properties measuring devices. Illustrative of this development is the development of nanotech versions of its voltmeter, ammeter and multimeter electrical test and measuring instruments. Completely new metrology tools are starting to appear as well, however, with BioForce Nanosciences nanoarray-based biomolecular analysis system among numerous examples that could be cited.

SAMPLE PAGE

Numerous private-sector companies are involved in the development and production of nanotech measurement tools. These include the likes of Asylum Research, BioForce Nanosciences, FEI, Hitachi High-Technologies, Intel, JEOL, Keithley Instruments, KLA-Tencor, MTS Systems, Nanometrics, Quantum Dot, Roper Industries (via Gatan), Veeco Instruments and Zygo. As this listing would

COMPANY PROFILES presented for 35 players such as FEI, Hitachi, JEOL, KLA-Tencor, Roper and Veeco Instruments

TABLE V-1

NANOTECH TOOLS MARKET BY APPLICATION/SECTOR (million dollars)

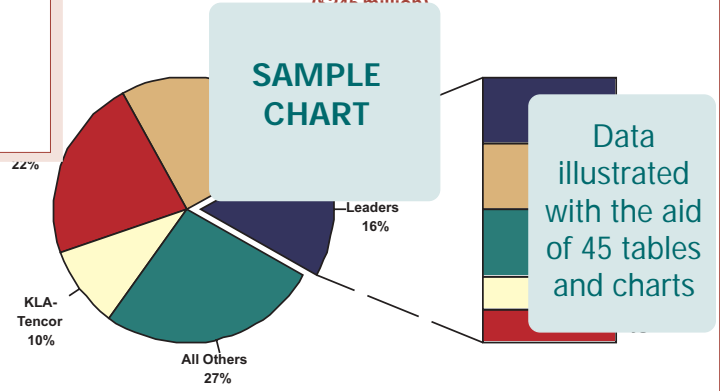
Item	2000	2003	2008	2013	2020
Gross Domestic Product (bil \$)					
\$ nanotech tools/mil \$ GDP					
Nanotech Tools Market					
Basic Research					
Electronics					
Biomedical					
Industrial					
Aerospace/Defense					
Other					

SAMPLE TABLE Historical data for 2000 and 2003 as well as Freedonia forecasts through 2008, 2013 and 2020

Source: The Freedonia Group, Inc.

CHART VI-1

US NANOTECH TOOLS MARKET SHARE BY COMPANY, 2003 (\$245 million)



SAMPLE CHART

Data illustrated with the aid of 45 tables and charts

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### MEMS: *Micro-Electromechanical Systems*

The US market for MEMS will grow over 19% annually through 2008. Gains will be driven by further tech sector recovery, advances in MEMS design and fabrication, and expanding uses. Best prospects include optical switches for telecom carrier and corporate networks; RF switches and relays for wireless phones; bio-chips; and tire pressure monitors. This study analyzes the \$1.4 billion US MEMS industry to 2008 and 2013 by product and application. It also assesses market share and profiles major competitors.

#1809..... 06/2004 ..... \$4100

### Nanocomposites

The nanocomposites market in the US will approach 345 million pounds in 2008 as they partially supplant traditional reinforced plastics in many applications. Nanoscale materials can increase plastics' strength, stiffness, and thermal/chemical resistance; reduce weight; enhance conductive properties; and either reduce or increase barrier permeability. This US study details the \$382 million nanocomposites industry by product, market and material. It also considers market drivers and profiles key industry players.

#1786..... 04/2004 ..... \$3900

### Electronic Displays

The US market for electronic displays will grow 12.4% annually through 2008. The best growth will remain in flat panel displays as they continue to usurp cathode ray tubes (CRTs) in desktop computer monitors and television screens. Thin-film transistor liquid crystal displays (TFT-LCDs) will remain dominant, especially in high-definition TVs. This study analyzes the \$11.6 billion US electronic display industry to 2008 and 2013 by product and market. It also evaluates market share and profiles leading producers.

#1787..... 03/2004 ..... \$3900

### Nanoporous Materials

Demand for nanoporous materials in the US will grow 4% annually through 2007, driven by new products and applications. Zeolites will remain dominant while activated alumina and silica gels grow the fastest. Environmental uses will outpace larger value markets such as oil refining, pet litter, detergents and water treatment. This study analyzes the \$1.6 billion US nanoporous materials industry to 2007 and 2012 by market, function and product. It also profiles key industry participants and presents market share data.

#1746..... 01/2004 ..... \$3900

### Nanomaterials

The US nanomaterials market will surpass \$1 billion in 2007, driven by the development of basic nanoscale materials such as metal oxides, nanotubes and buckyballs. Early growth will come from niche applications in the consumer products, defense, auto and printing industries, while longer run opportunities are focused on nanoelectronics and nanomedical devices. The study details the nanomaterials industry in the US to 2007, 2012 and 2020 by type and market. It also estimates company market shares and profiles selected firms.

#1677..... 07/2003 ..... \$3800

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