

## Nanotechnology Companies in the U.S.A: A Web-Based Analysis of Companies and Poverty Alleviation

**Duy Do**

**Electrical Engineering, San Antonio College**

*NNIN REU Site: Nanotechnology Research Center, Georgia Institute of Technology, Atlanta, GA*

*NNIN REU Principal Investigator: Dr. Susan Cozzens, School of Public Policy, Georgia Institute of Technology*

*NNIN REU Mentor: Mr. Thomas Woodson, School of Public Policy, Georgia Institute of Technology*

*Contact: duy\_dot@yahoo.com, scozzens@gatech.edu, tswoodson@gatech.edu*

### Abstract:

In the United States, many firms are expanding their research and development on nanotechnology products. But what products are being developed and who will benefit from them? This study answers these questions by analyzing the goals, nanotechnology experience, corporate social responsibility and products from companies' websites. Based on patent data from the Center for Nanotechnology and Society-Thematic Research Cluster One, we obtained a list of fifty-five firms that are leaders in nanotechnology in water, energy and agri-food. We chose these areas because we think they will have a big impact on the poor and on inequality. Out of the fifty-five companies, twenty-seven mention nanotechnology. Moreover thirty-one firms are developing products that will benefit both the rich and poor, while only seven firms, such as computer and textile industries, focus only on rich consumers. In general, agri-food companies do not discuss nanotechnology on their websites. Most of the companies produced intermediate materials used by other companies; very few of the companies sell nano-products directly to consumers. Overall, we conclude that nineteen out of fifty-five companies are developing nanotechnology products, like low cost water filters or solar cells that could help the poor and reduce inequality.

### Introduction:

Governments spend a large amount of money on research and development for a variety of problems. Three important areas that have received attention are water, agri-food and energy technologies. For example, we are at an extremely critical stage in our energy use portfolio. The world bases much of its energy use on non-renewable fossil fuels and nuclear power, and another potential technology that can ameliorate our dependence on fossil fuels faces a lot of public controversy.

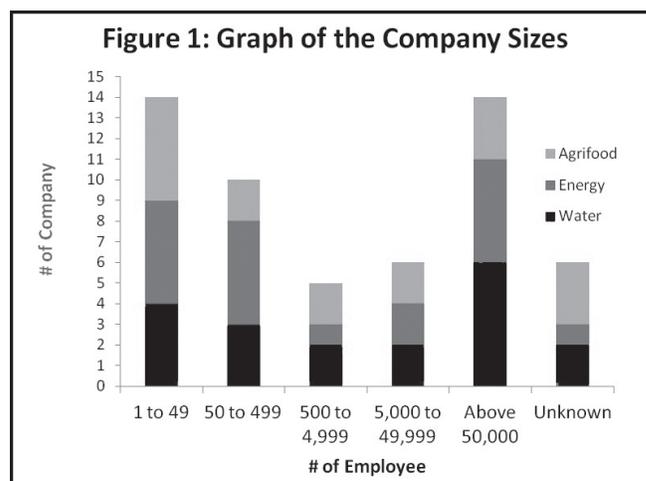
However, there are many solutions to these problems and we think research and development in nanotechnology can address some of these issues. Therefore, the purpose of this research was to perform a web-based analysis of nanotechnology companies in United States: What nano-products are being developed? Who benefits from these products? Does nanotechnology alleviate poverty?

### Methodology:

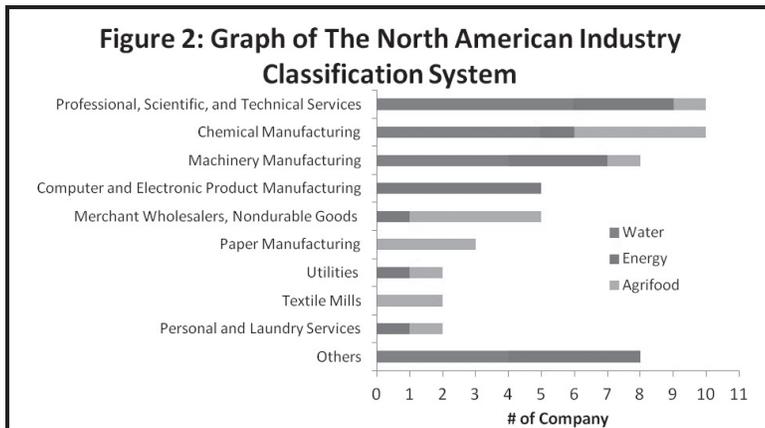
The Center for Nanotechnology and Society-Thematic Research Cluster One provided patent data from 2005 to 2009 of the top companies with nanotechnology patents in United States. We focused on three areas; water, energy and agri-food. We chose these areas because we think they will have a big impact on poverty and related inequalities. In each of the categories, we selected the top twenty nano-patenting companies — however there were only fifty-five companies total in the sample because some companies were repeated in two different categories. For example, General Electric was a top producer of nanotechnology patents in both energy and water nanotechnology patents.

After compiling a list of companies, we went to each company's website and collect information about their history, research, products and size. In addition to basic company information, we used their search tool to find out what the companies said about poverty and nanotechnology.

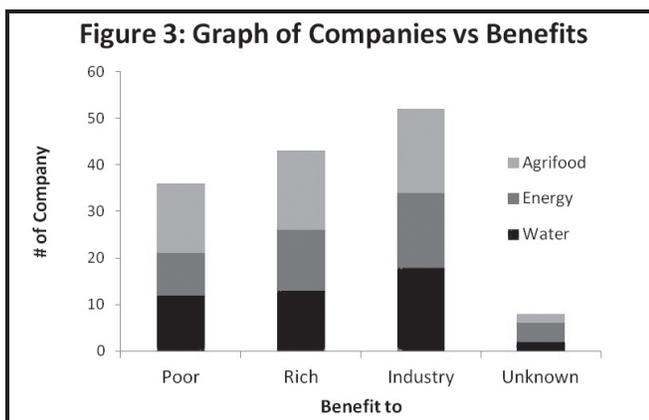
A second major source was Nexus Lexus Academic. We used that site to search for the North American Industry Classification System (NAICS) of the companies. Finally we analyzed the information we found.



**Figure 2: Graph of The North American Industry Classification System**



**Figure 3: Graph of Companies vs Benefits**



**Results and Conclusions:**

The companies were a variety of sizes; fourteen companies had under fifty employees; while another fourteen had more than 50,000 employees (Figure 1). For example, in 2011, International Business Machines Corporation had 433,362 employees, but at the same time Konarka Technologies Incorporation had only twenty-five employees. Small firms were energies nanotechnology companies usually established late in the twentieth century.

In Figure 2, we used NAICS, “the standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.” [1]. Many companies span a variety of different fields. Once we had the list of companies, we examined the types of products they made and who would benefit from those products. We then classified the companies as either helping the poor, rich, or industry (Figure 3).

More than thirty firms develop products that will benefit the poor. For example, Koch Membrane is “helping millions of people live healthier lives by developing better ways to purify the world’s water sources, improve food processing, and

more.” [2]. Nanosolar says, “By printing CIGS-inks on low-cost aluminum foil, Nanosolar is utilizing its proprietary high-throughput roll-to-roll printable semiconductor technology to enable the world’s lowest-cost thin-film solar panels.” [3].

We found few companies benefit only the rich. Companies that sell products that only help the rich are developing products like expensive apparels or furniture that has anti-static, and spill technology.

We found that twenty-seven companies discuss nanotechnology on their websites. However, none of the agri-food companies mentioned nanotechnology. We suspect these companies are hesitant to talk about nanotechnology because nanotechnology is not well-known by the public, therefore the public might have negative reactions of having nanotechnology in their food.

Most of the products produced by these twenty-seven companies were intermediate materials, like chemicals, used by other companies. Very few companies sold the nano-products directly to consumers.

Only twenty-seven of the fifty-five companies mention poverty. For example, one company said that, “Our membrane filtration elements are in use worldwide, producing enough clean water daily to sustain healthy living for four hundred million people” [4]. However, when we examined the products of the companies, only nineteen out of fifty-five companies were developing nanotechnology products, like low cost water filters or solar cells, that could help the poor and reduce inequality.

**Acknowledgements:**

I would like to acknowledge the National Nanotechnology Infrastructure Network Research Experience for Undergraduates (NNIN REU) Program and the National Science Foundation for funding. I also thank my mentor, Thomas Woodson, Principal Investigator, Dr. Susan Cozzens, site coordinators, Dr. Healy Nancy and Leslie O’Neil, NNIN staff and everyone who helped me on this summer research project.

**References:**

[1] Census Bureau <<http://www.census.gov/eos/www/naics/>>  
 [2] Koch Membrane System <<http://www.kochmembrane.com/About-Us.aspx>>  
 [3] Nanosolar Communication. Nanosolar Raises \$70-Million in New Capital. (2012) <<http://www.nanosolar.com/company/blog>>  
 [4] Hydranautics <<http://www.membranes.com>>