



United States Patent and Trademark Office

Nanotechnology-Related Issues at the United States Patent and Trademark Office

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Patent Examining Organization

9 Technology Centers (TCs)

TC 1600 -Biotechnology & Organic Chemistry

TC 1700 -Chemical & Materials Engineering

TC 2100 -Computer Architecture Software & Information Security

TC 2400 -Networks, Multiplexing, Cable & Security

TC 2600 -Communications

TC 2800 -Semiconductors, Electrical & Optical Systems & Components

TC 2900 -Design Patents

TC 3600 -Transportation, Construction, Agriculture, National Security & E-Commerce

TC 3700 -Mechanical Engineering, Manufacturing and Products

About 350 Art Units (~12-25 examiners per Art Unit)

average ~50 Art Units per Technology Center

About 6,000 Patent Examiners

Between 600-1,000 Examiners per Technology Center



Nanotechnology Topics

- How to define Nanotech-Related Patents and Classification
- Examining and Searching Nanotech-Related Patent Applications
- Nanotech-related Patent Statistics



Nanotechnology-Related Patents – How to define them

What defines a “Nanotechnology-Related Patent” for USPTO Classification purposes?

Nanotechnology is the understanding and control of matter at **dimensions of roughly 1 to 100 nanometers** (a nanometer is one-billionth of a meter), where **unique phenomena enable novel applications...** At this level, the physical, chemical, and biological properties of materials differ in fundamental and valuable ways from the properties of individual atoms and molecules or bulk matter.

USPTO classification (Class 977) definition is consistent with the National Nanotechnology Initiative (NNI) definition, which is also consistent with other major IP Offices in the world.



Class 977: Nanotechnology Subject Matter Defined

Two-prong test for Class 977 subject matter:

At least one physical dimension of $\sim 1-100$ nm

AND

Special property, function or effect

uniquely attributable to the nano-sized dimension



What's special about Nanotech?

Some ways Nanotech is “different” than traditional technologies...

- it more of a “scale” of science than a specific technology
- it touches on a wide array of traditional disciplines and technologies
- this cross-discipline nature often makes it challenging to categorize (classify) as well as to find the most relevant prior art



Classification System

The creation of cross-reference Class 977 for Nanotechnology and its expanded 263 subclasses provides the USPTO with:

- 1) A consolidated area of search to supplement the patent application examination process as an enhanced search tool.
- 2) A mechanism by which Nanotechnology-related U.S. Patent activity can be analyzed by the USPTO and the public.
- 3) A foundation for further nanotechnology classification progress.



Nanotechnology Topics

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- **Examining and Searching Nanotech-Related Patent Applications**
- Nanotech-related Patent Statistics



Examination & Searching

- Due to multi-disciplinary nature of nanotech, currently no specific nanotechnology Technology Center, Work Group or Art Unit
- Currently a set of examiners serving as nanotech “points-of-contact” (POCs) in each Technology Center
- Continuously building expertise within subject matter areas



Nanotechnology Topics

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- **Nanotech-related Patent Statistics**

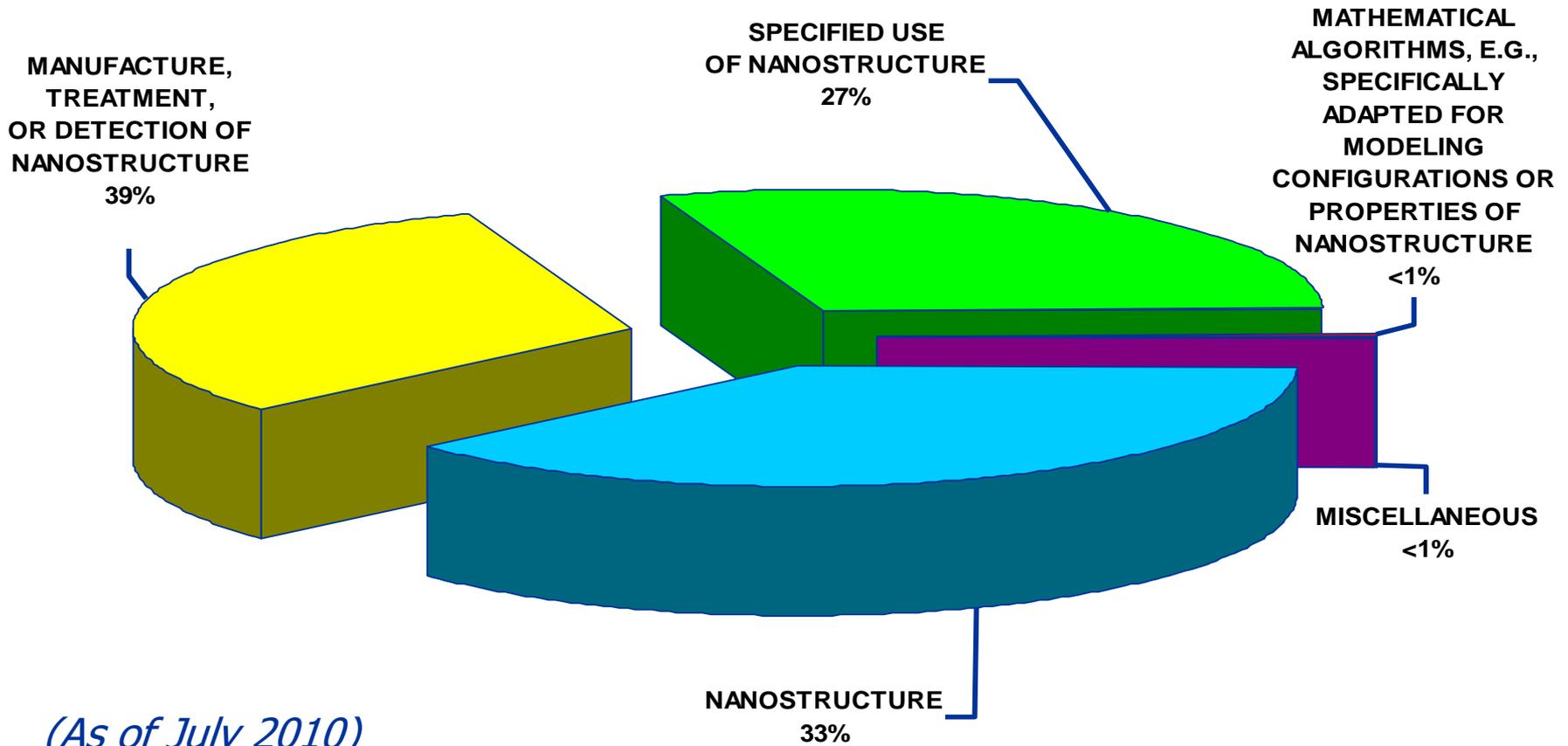


Current Class 977 Patents

Technology Center	Number of Patents
1600 - Biotechnology and Organic Chemistry	972
1700 - Chemical and Materials Engineering	1813
2100 - Computer Architecture Software and Info. Security	22
2600 - Communications	242
2800 - Semiconductor, Electrical, Optical Systems	2737
3600 - Transportation, Construction, Electronic Commerce	51
3700 - Mechanical Eng., Manufacturing and Products	408
<i>(as of July 2010)</i> Total	6245



Nanotech Patents & Pre-grant Publications By Type of Invention



(As of July 2010)



Statistics for Nanotech-Related U.S. Patents

Data on U.S. Patents is fairly consistent regardless of the way it is searched, about **60% of nanotech-related U.S. Patents are U.S.-origin** (awarded to U.S. inventors or U.S. assignees/owners).

Huang et al paper 2004, key-word search on seven basic nanotech terms in USPTO data base, country based on assignee or owner. Whether search of full-text or just title/claims, whether 1976-2002 or just 2003, **about 60% U.S. Patents awarded to U.S. inventors or U.S. assignees/owners.**

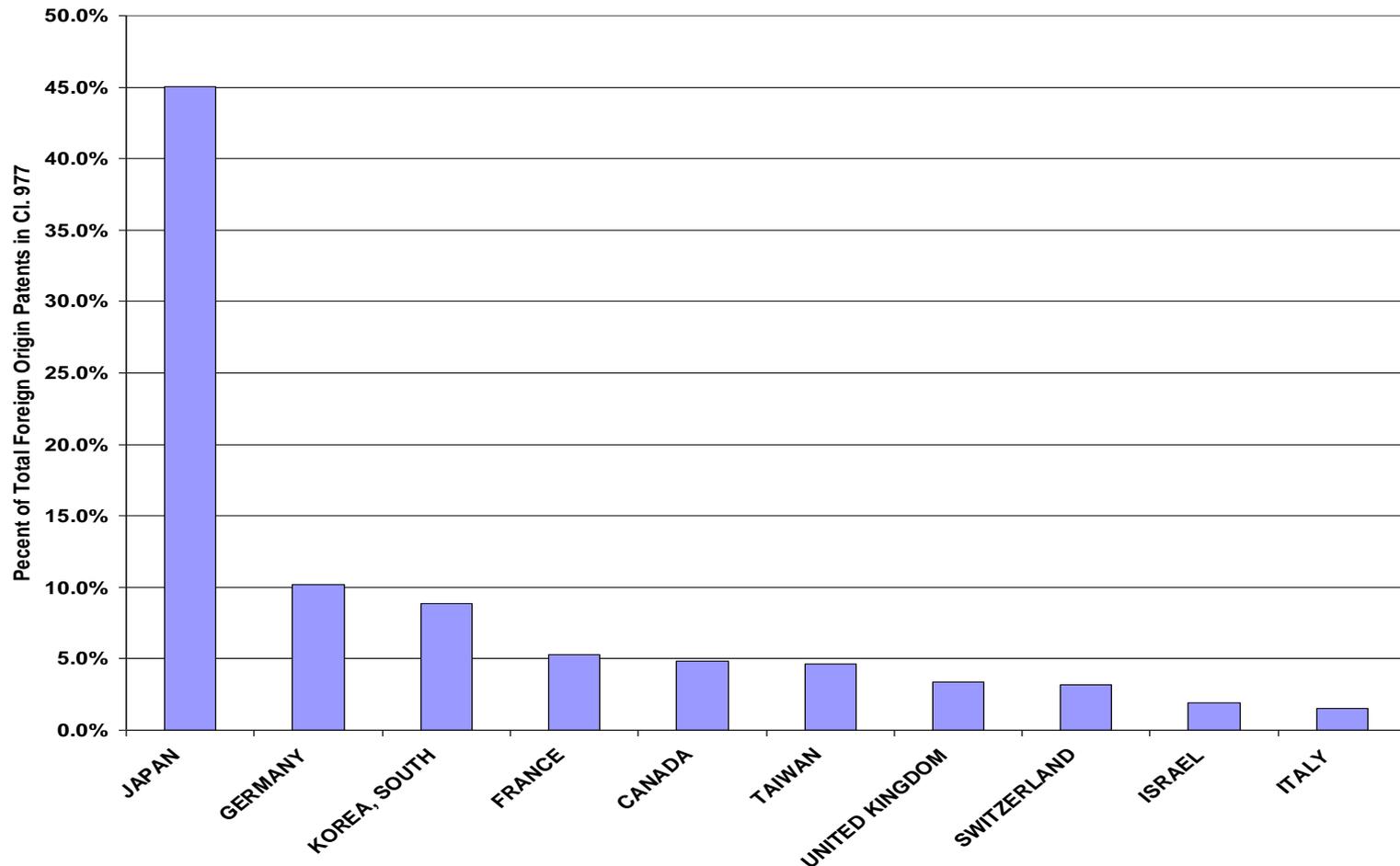
Search of patents placed in USPTO cross-reference Class 977 on nanotechnology, whether first named inventors or assignees/companies, whether 1977-2009 or just 2009, **about 60% U.S. Patents awarded to U.S. inventors or U.S. assignees/owners.**

Next most active countries: Japan, Germany, and Korea.



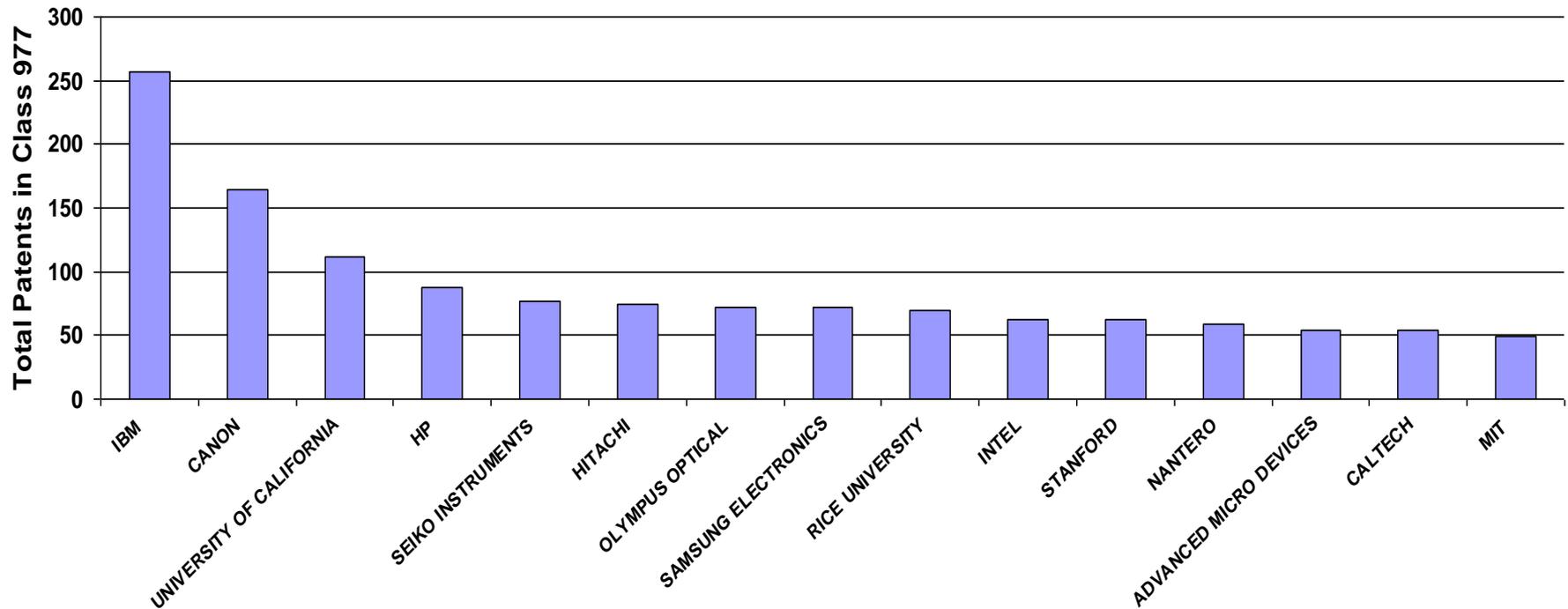
Class 977 U.S. Patent Statistics: Top Foreign-Origin Countries

(calendar years 1977-2009)





Class 977 U.S. Patent Statistics: Top 15 Assignees (calendar years 1977-2009)





U.S. Patent Data vs. Global Patenting Publication Data

A search of just **U.S. Patent data** does **not** reflect **global patenting activity**.

U.S. Patent data identifies those seeking patent protection in the U.S. only.

Certain challenges in making comparisons using global patent data due to differences in patent practices. For example:

- Differences in when patent publications occur relative to filings, and the time from application filing to patent grant.
- Differences in patentability standards.
- Accounting for filings of the same invention in multiple countries.



Global Patent Statistics

Search using Derwent World Patent Index (DWPI). DWPI includes about 72 countries.

Identify as nanotechnology by either Derwent codes for nanotechnology or nanotechnology International Patent Classification (IPC) codes. *(did not use key-word search because it would be limited to English language translations of abstracts for many foreign patent publications)*

Identify any type of patent publication (includes pre-grant publications as well as grants).

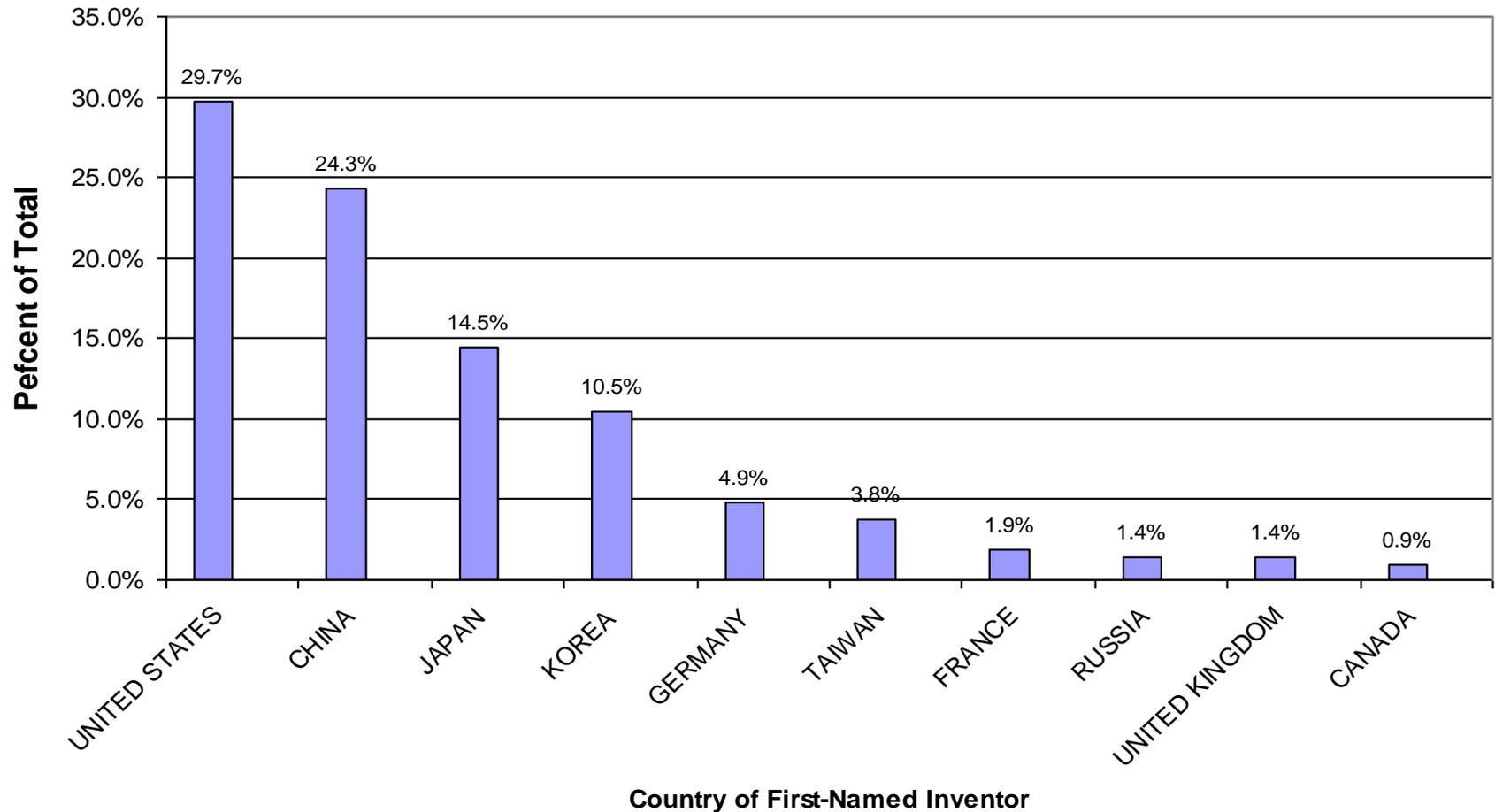
Evaluated nanotech-related patent publication data in a variety of aspects:

- Country of first-named inventor
- Country of assignee/owner
- First occurring patent publication
- Same inventions filed in 3 or more countries



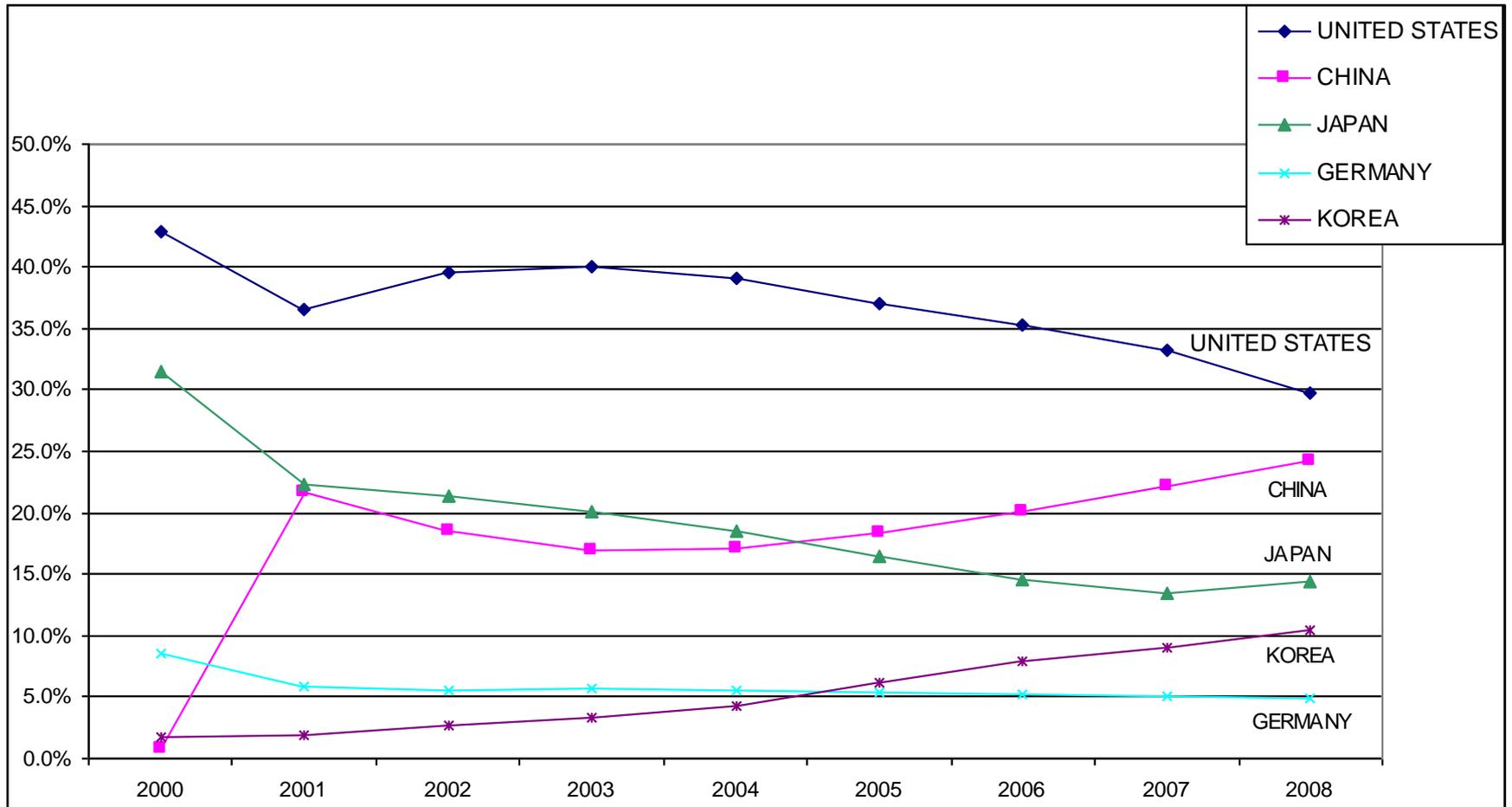
First-Occurring Nanotech-Related Patent Publications

(by Residence-Country of First-named Inventor, 1986-2008, Derwent WPI)





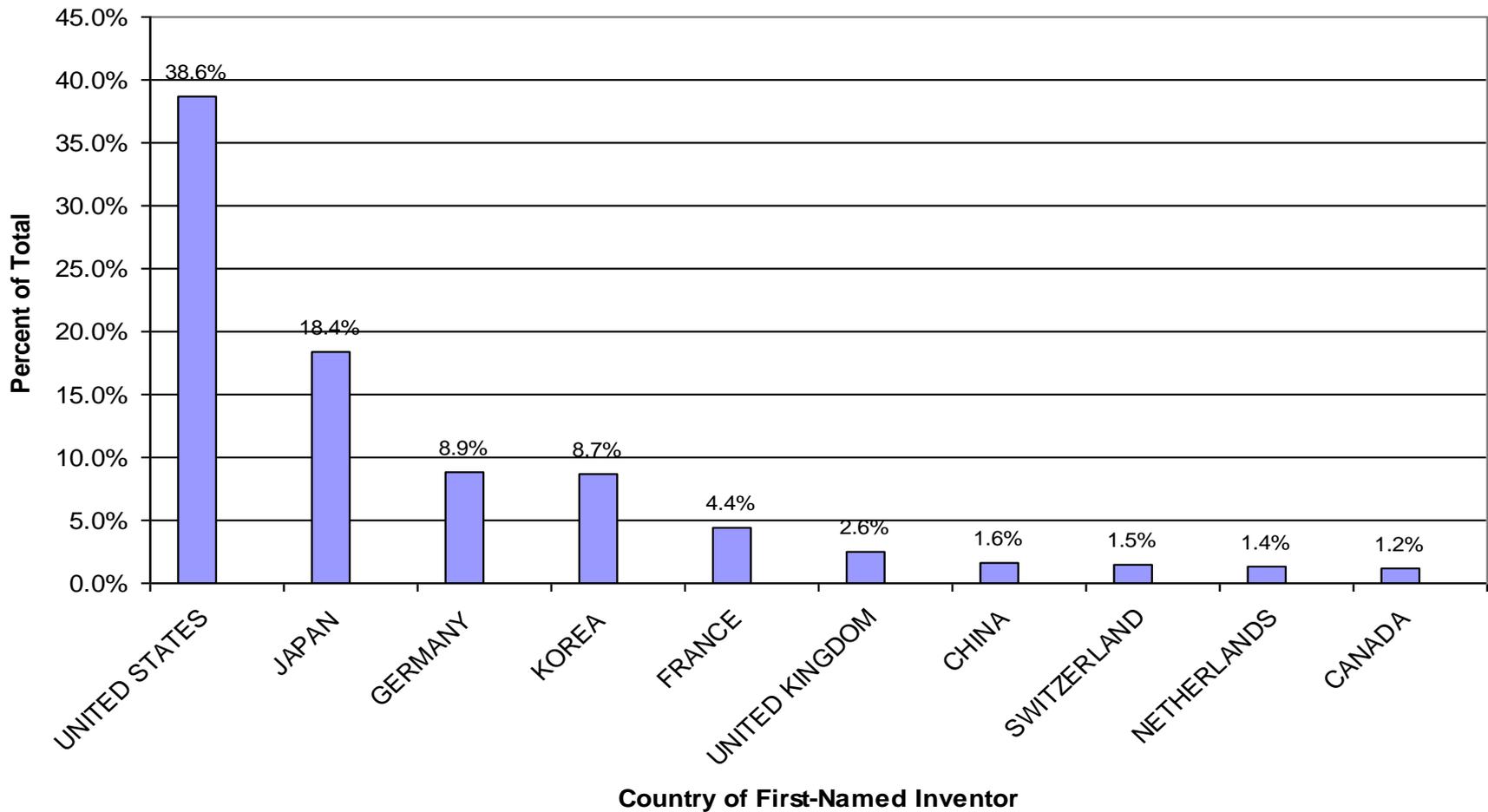
First-Occurring Nanotech-Related Patent Publications- Top-5 Countries, Relative Percent of Total (by Residence-Country of First-named Inventor, Derwent WPI)





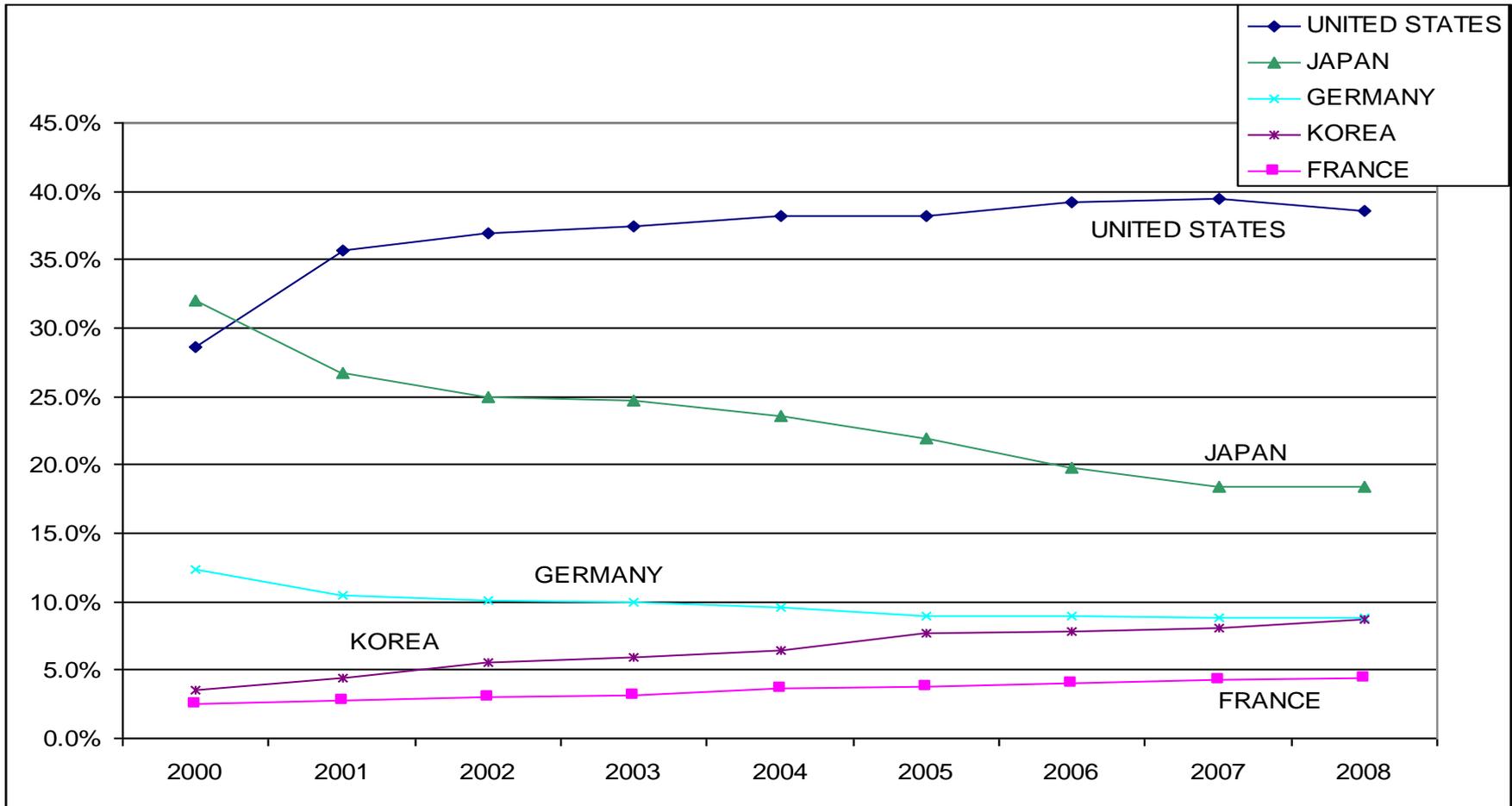
Nanotech-Related Patent Publication on Same Invention in 3 or More Countries

(by Residence-Country of First-named Inventor, 1986-2008, Derwent WPI)





Nanotech-Related Patent Publications on Same Invention in 3 or More Countries – Top-5 Countries, Relative Percent of Total (by Residence-Country of First-named Inventor, Derwent WPI)





Nanotechnology Patent Statistics: Summary

U.S.- origin inventors and assignees/owners:

- most nanotechnology-related U.S. Patents by a substantial margin,
- most nanotechnology-related patent publications globally based on country of first-named inventor, but losing ground to China,
- 2nd most nanotechnology-related patent publications globally based on country of assignee (China is 1st), **and**
- most nanotechnology-related inventions with patent publications in 3 or more countries, **indicating a more aggressive pursuit of international IP protection.**

The next most active countries pursuing nanotechnology-related patents globally, besides the U.S., include Japan, Germany, Korea and France.

While China continues a steady increase in the number of nanotech patent publications, China is not seeking global protection (filing in 3 or more countries) to the same extent as other top countries (U.S., Japan, Germany, and Korea).



Thank You

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