2.11. Nanosciences

Nanosciences can help achieve a wide range of economic and social objectives, from solving fundamental questions related to the immune system, to accelerating advances in genomics and contributing to the generation of renewable energy. Core scientific articles identify the most influential contributions to research. Citations to core articles in nanosciences provide a measure of research activity in this field.

Nanosciences include three main research areas: chemical synthesis, superconductivity and quantum computing, and nano materials and devices. The number of citations to core articles in nano materials and devices (25.0%) and superconductivity and quantum computing (17.8%) has increased more rapidly than the total number of citations (15.8%) between 2002 and 2007. Citations to core articles in chemical synthesis have been growing at a slightly slower rate (15.2%). These trends show the increasing influence of research in nanosciences in recent years.

Research activities show a clear specialisation in nanosciences in a minority of OECD countries. Seven countries report a share of citations above the world average in chemical synthesis, eight in superconductivity and quantum computing, and eight in nano materials and devices.

Singapore has the largest relative share in all three areas, particularly in nano materials and devices, and Switzerland ranks second. The United States ranks third in chemical synthesis and nano materials and devices and Germany in superconductivity and quantum computing. This indicates that the last two countries have not only a relative advantage but also a substantial influence in nanoscience, as they are the largest producers of scientific articles.

In China, India, Italy and Spain, the share of citations to nanosciences is below the world average in all three areas.

Research in nanosciences

Clusters of articles with similar research subjects were identified via co-citation analysis. Co-citation is a form of citation in which a set of articles is simultaneously cited by other articles. A total of 64 958 highly cited articles, *i.e.* the top 1% of cited articles in the database from 2001 to 2006, were clustered on the basis of co-citation relationship.

Nanoscience is a new field, and it has as yet no established definition. The co-citation analysis identifies three main areas in which there has been active research in recent years: chemical synthesis, superconductivity and quantum computing, and nano materials and devices.

Of these three areas, chemical synthesis has a long history in chemistry, which still has a vast unexplored field. Superconductivity and quantum computing is an area that combines concrete application and the study of basic laws of physics, and it is attracting the attention of many researchers. Nano materials and devices have possibilities of wide-range application and are the focus of strategic research in many countries.

Source

OECD calculations, based on Scopus Custom Data, Elsevier, July 2009.

Going further

Igami, M. and A. Saka (2007), "Capturing the Evolving Nature of Science, the Development of New Scientific Indicators and the Mapping of Science", *OECD Science, Technology and Industry Working Papers* 2007/1, OECD, Paris, *www.oecd.org/sti/working-papers*.

Figure notes

The average annual growth rate of the number of citations to core articles is based on the year of publication of the citing articles.

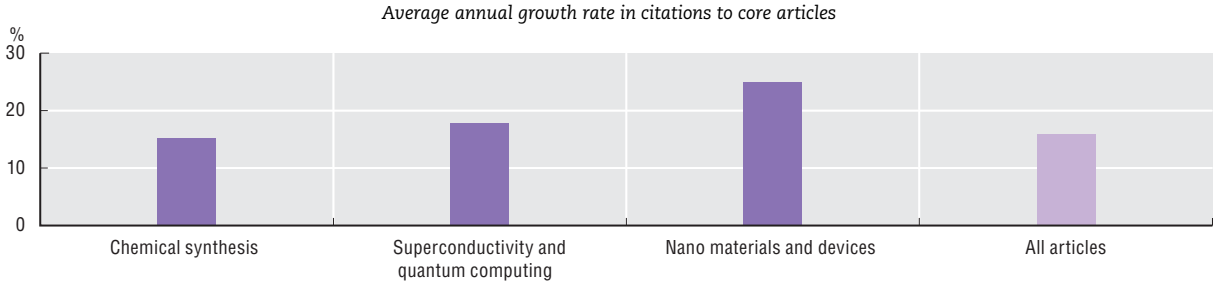
Calculation of a country's share is based on the address of the institution to which the authors belong and fractional counts.

Only countries with a share of core articles over 1% are included.

A country's relative share in core articles is calculated by dividing the country's share in core articles by the country's share in all articles in all scientific fields.

Trends in core articles in selected nanoscience, 2002-07

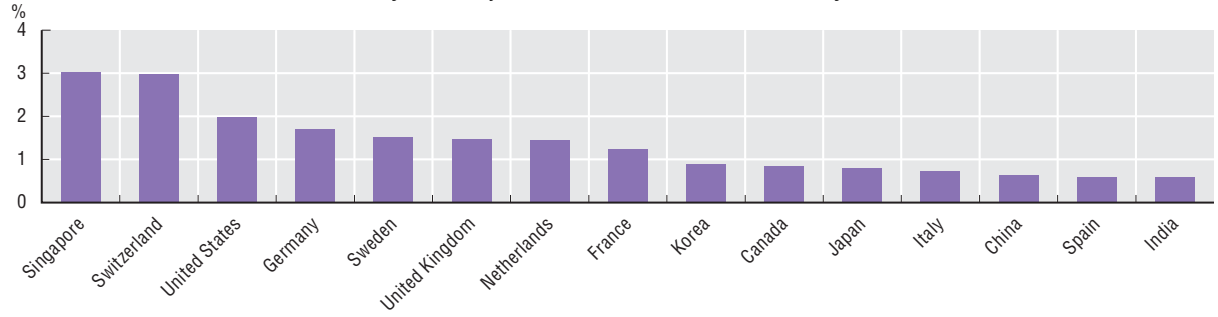
Average annual growth rate in citations to core articles



StatLink http://dx.doi.org/10.1787/743866000335

Countries' relative share in core articles in chemical synthesis, 2001-06

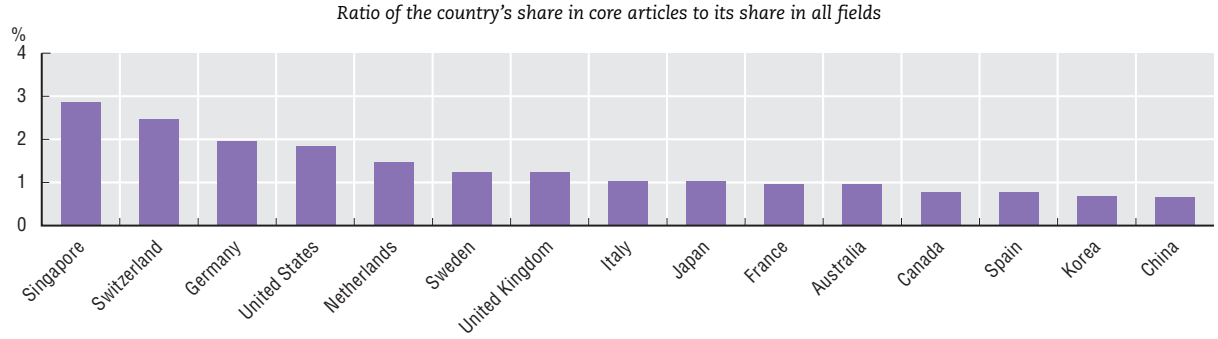
Ratio of the country's share in core articles to its share in all fields



StatLink http://dx.doi.org/10.1787/743886181846

Countries' relative share in core articles in superconductivity and quantum computing, 2001-06

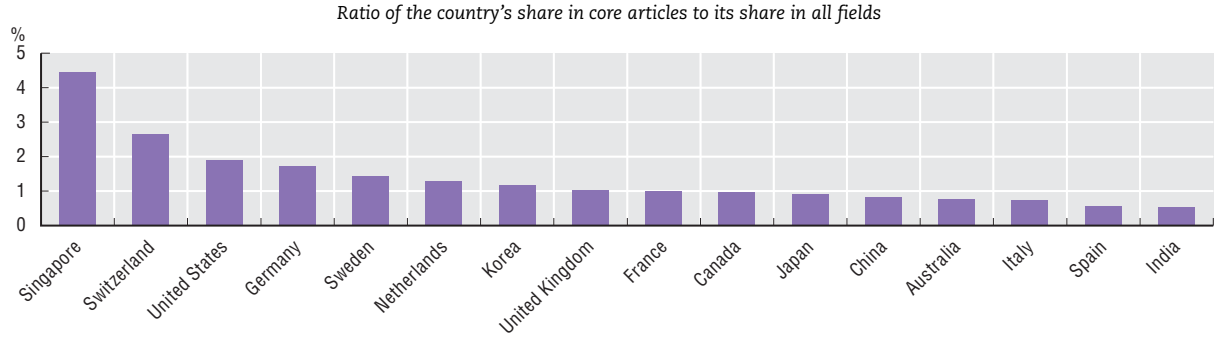
Ratio of the country's share in core articles to its share in all fields



StatLink http://dx.doi.org/10.1787/744032055334

Countries' relative share in core articles in nano materials and devices, 2001-06

Ratio of the country's share in core articles to its share in all fields



StatLink http://dx.doi.org/10.1787/744114222585

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