

## Advance Material Petroleum in Sea Underground Water Surface Energy

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### ABSTRACT

Based on bibliometric analysis, this paper explores China's publication activity in chemistry. China develops fast in chemical research and has taken a leading position in publishing journal papers. International collaboration plays a role in the Chinese chemical community, but this role varies among subfields.

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### Introduction

During more than ten years, Chinese scientific publications included in the Science Citation Index (SCI) have grown exponentially. Since 2006, China has taken the second position in world publications [1-3]. China's publication activities among disciplines are not evenly distributed: the country is more active in traditional fields such as chemistry, physics, and mathematics, while the Western nations are more active in clinical medicine and biomedical fields [4-6]. The Chinese chemistry community is not only the most productive but also the most active in international collaboration in terms of journal publications. One would be curious about where Chinese chemistry stands in the world? How are subfields of chemistry distributed in this country? Who are China's main partners? Which Chinese research output has high international impact? This paper is dedicated to answering these questions.

### Materials and Methods

Our analysis is based on publication data from the Science Citation Index Expanded (SCIE) and the Conference Proceedings Citation Index Science (CPCI-S). The subject categories of the Institute of Scientific Information of Thomson Thomson Reuters (ISI) classify the field of chemistry into eleven subfields.

These are: thermodynamics, applied chemistry, medical chemistry, multidisciplinary chemistry, analytical chemistry, inorganic & nuclear chemistry, organic chemistry, physical chemistry, electrochemistry, polymer science, and chemical engineering. Biochemical journals assigned to the subject categories "biochemical research methods" and "biochemistry & molecular biology" are not included in this study since they are often relevant to biology more than chemistry. The most recent year for the data collection was 2007 since your some publications in 2008 might

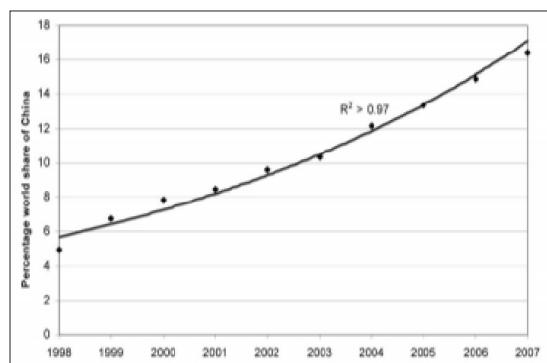
have not been indexed by the ISI at the time (i.e., April 2009) this study was undertaken. In 2007, the SCIE covered 635 journals in chemistry, from which we collected publications in the last ten years. Only articles, letters, proceedings papers, and reviews are counted because these are citable items.

### Results

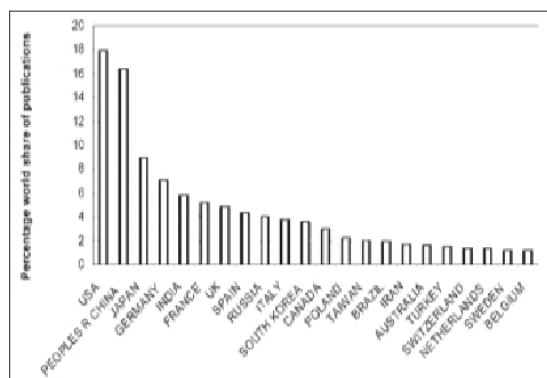
Main issues addressed in this paper include the development of the Chinese publication profile in chemistry, China's world position, highly cited publications and their affiliations. International collaboration is also investigated.

### Overview on Chinese Publications in Chemistry

A ten-year window is used to map the development of Chinese publications. From 1998 to 2007, China's world share of publications in chemistry grows exponentially (Figure 1). Over 16 percent of the world's publications in 2007 involve Chinese authors, while this figure was only approximately 5 percent ten years ago. The rapid growth of Chinese publications makes China a leading nation in publishing chemical papers. In 2007, China ranked the second right after the USA (Figure 2). The difference of world share of publications between these two countries was only 1.5 percent in 2007. Given the current momentum, China can be expected to replace the USA as the largest producer of chemical publications within one or two years. In terms of international collaboration, there are 3,650 papers co-authored internationally, that is, more than 15 percent of the total Chinese publications. The USA, Japan, and Germany are China's most important partners. The three countries contributed almost half of Chinese internationally co-authored publications in 2007. The two subfields (i.e., physical chemistry and multidisciplinary chemistry) which publish the highest number of papers are also the most active in international collaboration.



**Figure 1:** Development of China's World Share of Publications (1998-2007)



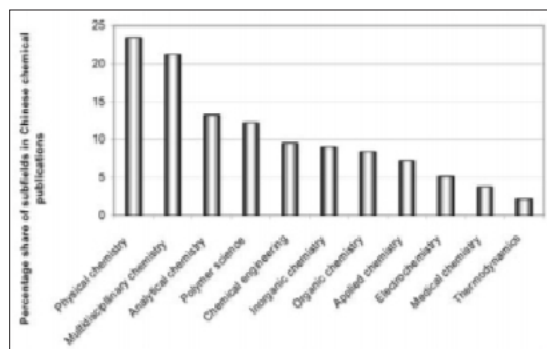
**Figure 2:** Percentages of World Shares of Publications in Chemistry

### Performance of Individual Subfields

In this section, we focus on the profiles of the 11 subfields. Major issues include publication distribution, highly cited papers and their contributors. International collaboration is also explored.

### Publication Distributions of Subfields

Among the 23,581 Chinese papers published in 2007, most are in physical chemistry (23 percent). The detailed subfield distribution is shown in Figure 3.



**Figure 3:** Publication Distribution of Sub-Fields in Chinese Chemistry

It must be noted that the number of publications in each of the 11 individual subject categories is not addible since the ISI assigns many journals to more than one category.

### Highly cited Publications

We examined the five most highly cited papers in each

category in more detail (Appendix 1) (8). The ranking is based on the citation counts at the time of the download (April 17, 2009). All these most highly cited publications are the results of collaborations either within an institution, among institutions, or among countries (i.e., international collaboration). In subfields such as chemical engineering, organic chemistry, inorganic & nuclear chemistry, analytical chemistry, and applied chemistry, there is no international collaboration in the top-five most highly cited papers. This may imply that China can rely on itself to receive high citations in these subfields.

But international collaboration plays an important role in thermodynamics, polymer science, and medical chemistry in China.

Each of the top-five most highly cited papers in thermodynamics is the result of international collaboration.

Crosswise comparison shows that publications in multidisciplinary chemistry receive higher citations than those in the other subject categories, which might be because multidisciplinary journals have more audience compared to those only focusing on one subfield and thus these papers have more chances to be read and cited.

Table 1: Lists institutions contributing to two or more of these most highly cited papers. Three research units from the Chinese Academy of Sciences (the Shanghai Institute of Organic Chemistry, the Institute of Chemistry, and the Changchun Institute of Applied Chemistry) contributed most. Nanjing University and the Graduate School of the Chinese Academy of Sciences are involved in four most highly cited publications.

Institutions	Number of highly cited publications
Chinese Academy of Sciences, Shanghai Institute Organ Chemistry	5
Chinese Academy of Sciences, Institute of Chemistry	
Chinese Academy of Sciences, Changchun Institute Applied Chemistry	5
Nanjing University	5
Chinese Academy of Sciences, Graduate School	4
Xiamen University.	4
Sichuan University	3
South China University of Technology	3
Nankai University	3
Fudan University	3
Zhejiang University	3
Zhejiang University	2
Wuhan University Technology	2
University of Science & Technology China	2
University of Leeds, UK	2
University of Hong Kong	2
Tsing Hua University	2
Southwest University	2
Northeast Normal University	2

Hong Kong University of Science & Technology	2
Chinese Academy of Sciences, Fujian Institute of Research on the Structure of Matter	2
Central China Normal University	2

### Conclusions

China has become a leading nation in publishing papers in chemistry and is challenging the position of the USA to become the largest producer. The Chinese chemical community is active in collaborating with international partners especially the USA, Japan, and Germany. Chinese authors in physical chemistry publish the most and are the most active in international collaborations. In some subfields such as chemical engineering, organic chemistry, inorganic and nuclear chemistry, analytical chemistry, and applied chemistry, the role of international collaboration is not as distinctive as in thermodynamics, polymer science, and medical chemistry in China.

In terms of institutional performance, institutions from Chinese Academy of Sciences have distinctive contributions to the most highly cited papers.

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