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Growing Globally:
How Scientists in China Can Share Their Research with the World

The Growing Globally series, sponsored by *ACS Central Science* and *ACS Omega*, demonstrates ACS Publications' commitment as a global publisher to encourage new and groundbreaking research from around the world. In this series, we will explore research in China, India, Brazil, and South Korea. ACS has collectively published over 48,000 papers from these countries over the last five years.

This white paper focuses on research from China, the world's second-largest publisher of scientific articles. Over the past five years, ACS journals published more than 32,000 articles from China, which is home to 30 ACS editors and 130 editorial advisory board members. These active researchers exemplify research excellence and provide leadership to ACS journals.

The goal of this white paper is to act as a resource for overcoming the obstacles authors in China may face in their efforts to publish their novel chemistry discoveries in the world's foremost academic journals.

Over the past few decades, China has undertaken steps to strengthen its national programs for science and technology research and development.

"The Chinese government has paid much more attention to fundamental science and has set up funding institutions to support scientists," said Dongyuan Zhao, PhD, professor of chemistry at Fudan University in Shanghai and senior editor of *ACS Central Science*.

The country has made great progress in the areas of applied, analytical, biological, inorganic/organic, physical, and nanomaterials chemistry. The Chinese government is also directing significant investment toward the development of sustainable energy. Several universities and agencies have established the Energy Materials Chemistry Collaborative Innovation Center (iChEM), which studies catalysis (novel natural gas transformation), photo energy conversion, batteries, and supercapacitors.

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Collectively, these initiatives have led to a dramatic increase in papers published. China's output grew four-fold from just over 20,000 papers in 1998 to upwards of 112,000 papers by 2008.[1]

Given this high level of productivity, it's more important than ever for researchers in China to produce high-quality work that sets them apart. There are five critical steps scientists can take to improve their chances of being accepted by a peer-reviewed journal.

1. Know the field

This advice applies worldwide, but is especially important in a place like China, where competition is fierce. At a minimum, your research should be both novel and rigorous. You probably already stay current on research in your area, so make sure to apply this knowledge when you are choosing new directions for your own research.

Xinrong Zhang, PhD, professor of chemistry at Tsinghua University in Beijing and associate editor of *Analytical Chemistry*, uses the Thomson Reuters Web of Science research platform and reads review articles from relevant journals to keep up with innovations in his field. Dr. Zhao says he also reads new papers daily to stay informed.

Topic popularity can also be a plus: journals may be more likely to accept papers that cover hot topics, which may earn many citations, increasing the journal's impact factor.

Another resource for locating key research is SciFinder. SciFinder is a research discovery application that provides unlimited access a comprehensive source of references, substances, and reactions. In addition to keeping up with the literature, international research conferences are a great way to learn about the latest trends.

Finally, be sure that you are submitting your research to the appropriate journal. Before submitting a manuscript, review a journal's stated scope to ensure your topic is relevant.

2. Partner with others – around the world

Science knows no geographical or political borders. Collaboration can benefit scientists by adding new research strengths and perspectives. In China, many funds are available to scientists for inter-governmental cooperation.

Dr. Zhao collaborates internationally on projects with labs from Japan, South Korea, U.S., Germany, U.K., Australia, Saudi Arabia, Qatar, and others. In addition to increasing research quality and widening its application, he says international cooperation helps cultivate talent and improve education. For example, Dr. Zhao and colleagues

partnered with the University of California on a large joint project to enhance undergraduate and postgraduate training in electron chemistry and porous catalytic material research. Students from the U.S. went to China for theoretical and experimental training, as well as electron microscope training. In return, students from China traveled to the U.S.

Dr. Zhang has also collaborated with many top groups around the world. To make these partnerships work, he and other parties interested in the same topic write a proposal to apply for funding. These funds usually cover the exchange of each other's students. When research is complete, it is published jointly by both groups.

With China's fast-growing research base, the country offers the rest of the world attractive research partners who can make vast contributions to current scientific knowledge.

3. Seek out funding

In China, research funding is generated by industry, universities, and the government. It is a challenging funding environment, but available funds will likely increase as China's economy strengthens. In fact, China is expected to surpass the United States as the world's top spender on research and development by roughly 2019.[2]

There are three leading science funders in China's government:

- **National Natural Science Foundation of China (NSFC)** – NSFC supports basic science. According to Dr. Zhang, in the current funding environment, there is sufficient funding available from NSFC for Chinese scholars who have a strong record of published work and who propose projects that are relatively novel.
- **Ministry of Science and Technology (MOST)** – MOST tends to support applied research. It is particularly focused on using technology to promote rural and social progress in China.
- **Chinese Academy of Sciences** – The Chinese Academy of Sciences operates the Institute of Chemistry, a multidisciplinary research institute dedicated to the basic research in broad fields of chemical sciences. Its major research areas span polymer science, physical chemistry, organic chemistry, analytical chemistry, and inorganic chemistry.

All three agencies issue grants through both competitive, peer-reviewed proposal processes and through contract-based research. Grants are sometimes aimed at achieving national goals or research priorities.

For researchers whose work is translatable and in-demand, funding is also available through industry partnerships. Corporations are increasingly interested in outsourcing their research needs to universities.

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It's a win-win situation: companies can accelerate innovation, and academic researchers benefit from an alternate stream of funding, resources, and translational expertise.

Before applying for a grant, be sure to assess which funding source best fits your research, as well as whether your research is commercially viable – which could make it a candidate for an industry partnership.

4. Take advantage of open access

You've researched the field, contacted collaborators, and secured funding for your research. Now, it's time to explain your findings. You want everyone to have access around the world, and you may want or need to meet different funding agency mandates.

For this reason, open access is a Chinese researcher's best friend. Open access sites are those that do not require subscription fees to access full-text articles. Many funders and journals are already mandating some form of open access, and there are moves to expand this further. ACS can help you meet your open access requirements through a variety of programs.

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5. Prepare a high-quality manuscript

The most important indicators of a scientific paper's value are a novel concept, advanced methodology, and broad significance. But how well a paper is written matters, too. Clear communication helps readers better understand the paper's meaning—which in turn can lead to more citations and greater impact.

A potential challenge Chinese authors may encounter is language. Because most scientific journals in China are published in Chinese, much current scientific development in China is not readily available to non-Chinese-speaking scientists. Therefore, Chinese researchers may consider translating their work into English before submitting to international publications.

Dr. Zhang suggests that Chinese researchers use simple English sentences to clarify their results. In this instance, clarity is more important than perfect grammar.

And for those who need language help, ACS offers author services to help researchers overcome barriers to scientific writing. For example, ACS ChemWorx helps scientists with translation, document formatting, and figure services. This allows researchers to focus on the science, improves the quality of the manuscripts, and ensures the language used in the paper is of appropriate quality.

CONCLUSION

China's scientific output has increased substantially over recent decades, with no signs of stopping. By producing novel research, collaborating internationally, seeking out funding sources, and using open access and authoring services, researchers from China can greatly improve the quality of their research and make a lasting impact on the field of chemistry.

Sources:
1 Global Research Report: China. Research and Collaboration in the New Geography of Science, Thomson Reuters, November 2009
2 OECD Science, Technology and Industry Outlook 2014

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