

CASE STUDY

ScienceDirect



How ScienceDirect Supports Chemical Innovation in the Oil Industry



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SCIENCEDIRECT USER AND SENIOR RESEARCH SCIENTIST

Integrated Oil & Gas Industry

As a Senior Research Scientist at a major integrated oil & gas company, John* uses ScienceDirect to lead R&D efforts in catalysis development. 24 years of experience has given him a laser focus on keeping ahead of the curve in new industry developments and promoting innovation from his team. Under his leadership his group ideates, develops and refines catalysts to perform more efficiently and yield more successful (and profitable) products for his company.

Catalysis is the lifeblood of the new product development process for John and his team. He explains that, “the strategy is simply to convert something of lower value into something of higher value. A catalyst enables one to transform material A to material B. A catalyst accelerates a transformation of a lower value refinery distillate stream into a higher value chemical.”

True innovation stems from continuous access to the cutting-edge science and developments found in journal literature

From his early days in academia, John recognized that success in innovation requires both grounding in science and forward-thinking based on the latest concepts and breakthroughs.

“Success is to be able to anticipate new developments. Even as a college student, my professor said that to be a relevant scientist today, you absolutely must go beyond what is taught in a textbook. You have to be able to go to the journal levels, because that is where research is published, that is where you get your new ideas,” he explains.

Also crucial to successful R&D is the ability to evaluate and prioritize work in line with corporate goals. His team’s mandate is not only to bring the company’s business leaders up to speed on potential new product or process ideas, but to then recommend the top investment opportunities based on their potential for profitability. John fulfills this responsibility by serving a consulting role for his fellow scientists. “I inform my peers of the latest developments in areas that are important to them. This is an important role because my colleagues rarely have the time or the accesses that I do,” he says. “Therefore, for me to do my job I need to have rapid access to the literature.” John relies on ScienceDirect to access this literature that is so vital to his R&D team.

Intelligent research fuels design of environmentally-friendly catalysts

Analysis of the existing literature is crucial to John’s team accomplishing their goals. They must ensure that the company’s commercial process byproducts are mitigated and rendered harmless. This requires an ongoing short-term cycle of mitigation process improvements as well as a longer-term focus on developing new catalysts and processes that generate fewer byproducts. New processes also must be of equivalent or lower cost in comparison to the incumbent process.

“Ultimately, all of these short-term mitigation steps cost a lot of money over a long period of time. So the long-term solution is to develop a new catalyst that does not make unwanted materials,” John says. “The long-term objective carries much



more risk, however. In the meantime, our short-term efforts are to develop more cost-effective mitigations. At the heart of this effort is one that is based on the fundamental scientific understandings that are reported in the literature.”

ScienceDirect’s peer-reviewed content puts researchers at the forefront of innovation and product patenting

Generating intellectual properties (patents) is essential to industrial R&D organizations. Ideas that have been proven are valuable properties, and John relies on ScienceDirect to stay current with developments that could fuel innovation within his team. “The sooner we have the idea, the sooner we can test it and secure a patent. The patent improves our chances of maintaining our competitive advantage,” John says. “But, you can’t do any of that until you are knowledgeable about what has been discovered.”

John scans 12 ScienceDirect journals each week (see the insert box on the following page for journal titles) to populate a regular, internally published report circulated as part of the Innovation Process. Searching and drilling down with keywords in ScienceDirect gets him to relevant information quickly, saving valuable time.

“I start broadly and examine the titles. The titles are usually excellent; they tell me right away whether the article is relevant. From the title scan, I isolate those that are relevant and then review their abstracts. And when the abstracts strike me as something that I need to study further, I order and study the articles.”

ScienceDirect’s large virtual technical library and accessibility from anywhere (including mobile devices) give John the easy access he requires in his fast-paced field. He can even view articles online ahead of the print schedule to stay on the cutting edge of new developments.

“Access is as simple as going to a conference where the speaker cites a paper, and then before the session is over, I will already have been able to see the article. This rapid access allows me to see the information and then follow up with the presenter before the conference is even over,” he says. “There have been times where I can say it’s a ‘what if moment’ when I came to the realization that what I’ve just learned could be helpful to us, and this requires a follow-up.”

In addition to accessing his “go-to” list of journals, John also uses ScienceDirect to keep up with China’s exponential growth in notable scientific discoveries. In the past,

John's Top 12 list of go-to ScienceDirect journals

Applied Catalysis
Applied Catalysis A
Catalysis Communication
Catalysis Today
Chemical Engineering Journal
Chemical Physics
Chinese Chemistry Letters
Chinese Journal of Catalysis
Journal of Catalysis
Journal of Molecular Catalysis A
Tetrahedron
Tetrahedron Letters

research directly reported from China did not appear as rapidly as publications from outside of China, which impeded access to relevant research findings.

“ScienceDirect publishes Chinese Chemical Letters and Chinese Journal of Catalysis from investigators of major Chinese universities and institutes in the English language. The reader can readily access their findings without costly delays due to the need to translate the articles,” John says.

Research spurs new directions and exciting opportunities for petrochemists in an evolving industry

A global producer of several products made from a petroleum distillate stream, John's company has seen a shift in their industry focus toward renewable resources. More than 10 years ago, John read a non-technical article on renewable energy and product resources that made him think about how his team could participate in this arena.

“A colleague had placed that article on my desk one day. As I was reading it I began to think about how one simple transformation of a widely available renewable molecule discussed by the author could produce a commodity product that is now made from fossil fuel. Immediately afterwards, I drafted a proposal that included arguments about why and how we should pursue this, and what it would mean if we were successful,” he says.

His proposal prompted new avenues of inquiry that are ongoing now, ten years later: “We have since experienced a

major directional change in our research strategy today. We are no longer just interested in converting fossil fuel-based materials, but also plant-based material to existing and new products. For me, it has been really gratifying because we are in the midst of a revolution.”

The focus on renewables put John's company on the map as an innovator with a diverse portfolio, and he continues to rely on ScienceDirect as a core source for keeping up with the research and identifying new directions to pursue in this area.

“If you're looking for renewables research findings, your chances are great in finding them in ScienceDirect. Their journals are really more industry-focused. The authors write in a way that provides the industry researcher the very key information that they need. And readers can get to it very quickly,” he explains.

Access to ScienceDirect catalysis journals is essential to John's team. Without it their information stream would dry up, hindering their progress as innovators and preventing their R&D success.

“We would fall way behind in our research on fundamental and practical development of catalysis. I want to emphasize this is not an exaggeration. Our awareness of the fundamental findings reported by others permits us to build on their findings. Productive research is built by this process – we cannot afford to reinvent the wheel. So access to information is vital. It really is the lifeblood of any vibrant R&D organization.”