The importance of industrial publications

Industrial publications are a very valuable and multifaceted tool for the wider catalysis community; they can foster the productive collaboration of university and corporate research laboratories, an essential partnership for the solution of important societal problems

Since the idea of a catalysis journal kicked off at Nature Research, one thing was clear: given the subject matter, the journal should certainly feature applied and technologically mature content. In a way, *Nature Catalysis* was born to be a home for contributions by researchers across the fundamental and technological catalysis landscape.

Catalysis as a discipline has always had close ties to industrial applications. In his essay "Reinventing Chemistry"[1], George Whiteside thinks back over the post-World-War-II era, when academic and industrial research witnessed a vibrant period of synergy and mutual exchange. "Catalysis…", so Whitesides says, "…became the core of large-scale synthesis" as fundamental discoveries worked their way through the manufacturing of the chemicals and materials that changed modern society — think for instance of plastics, synthetic fuels and more.

The collaborations between university and industry can lead to some friction, however. Intellectual properties issues, the publishing versus patenting competitions, or the differences in the attitude of academic and industrial scientists can become, in some cases, serious discouraging factors for joint research efforts[2].

Nonetheless, today there seems to be a strong attention to the collaboration between research organizations/universities and industry. This is reflected, for instance, in the current criteria to evaluate the performance of academic research, which more and more frequently require evidences of societal impact and practicality, often measured via the extent of collaboration with the private sector[3].

All in all, the benefits for a research organization scientist of fostering collaborations with industry are somehow intuitive — any difficulties in dissemination notwithstanding — and reflect an increasing trend according to which modern science is even more valuable when it shows an applied side. Must science always look for technological applications? Clearly not, considering the rich history of science on curiosity-driven research[4]. We do think, however, that when a scientific discovery shows a clear applied side, this should be recognized and ideally disseminated to the broader community of scientists.

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In practise, we as a journal try to foster the intellectual synergy between academia and industry by offering coverage of catalysis research topics of industrial and applied relevance, besides more fundamental studies. But unlike publications by university laboratories on catalysis topics of industrial relevance, the benefits of scientific publications for an industrial research laboratory may be less obvious at a first glance.

Publishing or, in general, scientific dissemination may be not always straightforward for a company. Although for universities, whose mission is the creation of new scientific knowledge, publication is often a major goal, corporate laboratories aim at generating profitability through the development of new technologies. In this perspective, secrecy (trade secrets) or patents are the preferred instruments to protect the economic interest of the company. However, as discussed in a document from the helpdesk of the European Union on intellectual properties[5], a publication can become a valid instrument — especially for small and medium enterprises — if the costs of patenting are not justified in light of the expected economic return. A so called defensive publication is important to link in the public eye a technology with a specific company, or to create prior knowledge that will eventually prevent competitors from patenting a similar discovery.

But in fact, there are a number of other reasons for companies engaged in catalysis research to publish in scientific journals. Guenter Schmid, electrocatalysis scientist at Siemens and author of a recent paper[6] in *Nature Catalysis* on the technical photosynthesis of alcohols by means of CO_2 electrolysis and fermentation has recently shared his thoughts with us on this topic. "As everywhere, industrial research depends on resources. Thus, we don't have all tools to fully characterize all of the effects we are observing." he explained. Publication becomes therefore a valuable tool to profile the expertise of a company to the scientific community and find partners, in order to initiate bilateral collaborations or other publicly funded projects with university. In a similar way, the innovation potential of a company becomes visible via publications, increasing its prestige. "Companies are also assessed by their innovation potential. Papers in well-recognized journals help to demonstrate innovation potential and sound product development".

Johannes de Vries, professor at the Leibniz Institute for Catalysis and former scientist at DSM shares a similar view: "In custom manufacturing (CM) it is important that potential customers know what technologies can be provided. Ideally the CM companies want to portray themselves as the technology leader in this area. So, once the patents have been filed, everything is published, preferably in high impact journals. I was in that lucky position during my 25 years at DSM."

Incidentally, publications have a much greater potential for dissemination, compared to the patent literature. The personal view of Michelangelo Scalone (and not that of F. Hoffmann-La Roche, whom employs him as a process chemist and catalysis expert) is: "Companies that have innovation as a fundamental pillar of their strategy are strongly engaged in research. Patents are essential indeed to protect and promote innovation. However, they are not sufficient to give the results the broad visibility they deserve. In fact, this visibility to the scientific community is given by the presentation at conferences and/or the publication in peer-reviewed journals. This process of open discussion and thorough check is instrumental to understand whether the results really do have the potential to impact positively the society. (The text reflects the personal opinion of Michelangelo Scalone on the topic "The benefits of scientific publications for an industrial research laboratory" only

and not that of the company he works for. This opinion can be mentioned only under these conditions)"

But there are also several educational aspects involved. A publication by an industrial laboratory may provide different perspectives to those found in university laboratories. In fact, the way of looking at catalysts performance, stability and practicality may vary between university and corporate practitioners. For example, "in academic electrochemical research mainly the onset-potentials of the chemical reactions are measured and compared to the theoretical thermodynamic limits" Schmid said. "At this point the conversion rate (current density) is close to zero and thus not relevant for application. We measure at high current densities to get the maximum conversion for application." Eventually experimental parameters are taken into account that are generally not in the focus of university research papers. On the other hand, the academic scientific community represents an important test bench for industrial scientists and in fact peer review works: "A successful submitted paper tells us, that our research is on a good academic level and the ideas behind the finding do not violate any fundamental laws" commented Schmid. And less formal exchanges of ideas and opinions can also be initiated by publication: "A company's excellent scientific reputation can only be appreciated by the authorities who value discussing with a highly qualified partner willing to address their questions in a scientifically sound manner" Scalone suggested.

A scientific paper is also a very good way to nurture the next generation of industrial scientists in some specific areas. "Pharma wants to attract top notch chemists for their Med Chem and Process Development groups. Thus, it is important to keep up the image that interesting science is performed in their labs to remain competitive as an employer.", de Vries says. Interestingly, Scalone emphasized very similar points: "the best students and young professionals prefer applying for jobs at companies with strong scientific-technical reputation because they see there the best chances to realize their potential. The above mentioned high visibility in the scientific community favours this process. Finally, I can only welcome the fact that, in many companies, a strong publication record is considered as very important to reach high responsibility positions in R&D".

And last but not the least: "Something personal: I am a researcher in the heart and to be an active and recognized part of the academic community is a source of satisfaction. Mostly, I write publications on Saturdays and Sundays because it is self-motivated" concluded Schmid.

Obviously, there are many more reasons that make an industrial publication interesting, and we only picked up some for the sake of brevity. However, we would like to conclude this editorial with one last consideration. The twenty-first century faces a number of societal challenges spanning from the sustainable procurement of resources — water, energy carriers, food — to the protection of the ecosystem and the eradication of diseases, where catalysis research can play a crucial role. And although the comprehension of the fundamental aspects of such problems may often start as an academic curiosity, their solution on large scale will require the combined skillsets of academia and industry. We hope our pages can become a virtual meeting space where catalysis scientists and ideas from both worlds first meet to find solutions to those problems. ❐

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References

1. Whitesides, G. M. *Angew. Chem. Int. Ed.* **54**, 3196–3209 (2015).
2. Jones, S. & Clulow, S. How to foster a culture of collaboration between universities and industry. *The Guardian* (2 August 2012).
3. Anslyn, E. V. et al. *Chem.* **1**, 173–179 (2016).
4. Agar, J. *Notes Rec.* **71**, 409–429 (2017).
5. *Fact Sheet: Publishing V. Patenting* (European IPR Helpdesk, 2015); https://www.iprhelpdesk.eu/Fact-Sheet-Publishing-v-Patenting
6. Haas, T. et al. *Nat. Catal.* **1**, 32–39 (2018).