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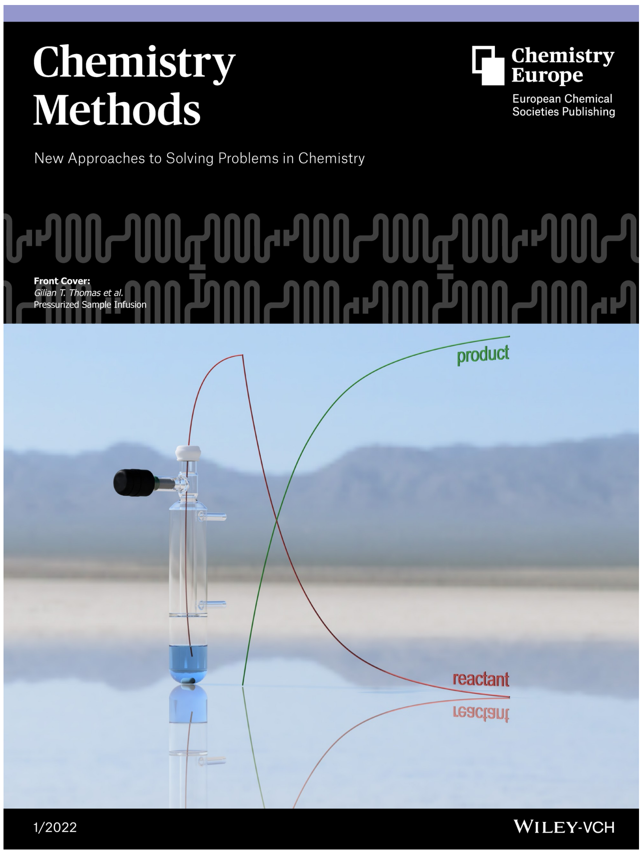
Pressurized Sample Infusion

University of Victoria

Invited for this month's cover is the group of Scott McIndoe at the University of Victoria (Canada). The cover picture shows a pressurized reaction vessel with tubing leading out of the flask. That tubing normally leads directly into an electrospray ionization mass spectrometer, where the mass-to-charge ratio and relative abundance of the solution phase ions are measured. These data can be used to generate chronograms for each solution species, shown here in the form of a reactant diminishing with first order kinetics, accompanied by the formation of a product ion. Read the full text of their Review at 10.1002/cmtd.202100068.



What was the inspiration for this cover design?

The cover art blends together some experimental details - the pressurized, modified Schlenk flask used in the PSI experiments, and the tubing that leads out into the mass spectrometer - with the reaction traces generated while performing the experiment. The design was constructed using 3D modelling software and superimposed on a background of a lake bed for some added visual interest before rendering.

What time-consuming dead-ends delayed the results before this breakthrough?

Clogging of the PEEK tubing when working with heterogeneous solutions would often result in flow restrictions, causing delays in getting timely reaction monitoring results. Luckily our work with simple filter attachments has helped to streamline the data acquisition process.

What do you consider the exciting developments in the field?

The ability to acquire data online and in real time. This provides a unique perspective of reactions as information can be inferred

Cover Profile
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related to reaction kinetics, and short-lived intermediates can be discovered.

What future opportunities do you see (in the light of the results presented in this paper)?

The unique glimpse at species detected at very low concentrations gives key insights into the mechanism of a reaction that might be overlooked using other methods. PSI is highly suited for studying catalytic mechanisms, determining their rate-limiting steps and identifying the key decomposition pathways that might inhibit catalytic activity. This information allows us to take steps towards improving the efficiency and functionality of important catalysts for real-world applications.