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About the author

Professor Adam Figiel (https://orcid.org/0000-0002-3443-1269) graduated in 1987 at the Wrocław University of Environmental and Life Sciences, where he successively obtained scientific degrees in the field of agricultural engineering. In the years 2013-2017 he was the Director of the Institute of Agricultural Engineering. Currently, he is the head of the Department of Thermal Technology and Process Engineering at the Institute of Agricultural Engineering. He has experience in research on food engineering as well as food processing using drying methods. In particular, he is interested in the drying kinetics, the influence of pre-treatment and drying parameters on the quality of the dried product and the energy consumption of the process. He is the author of over 190 scientific papers (h index=34), 6 chapters in monographs and two patents. He managed 9 projects with particular emphasis on the use of R&D results. He is a member of the Polish Society of Agrophysics and the Polish Society of Agricultural Engineering as well as the editorial board of Current Microwave Chemistry and Polish Journal of Food Engineering. He is the assistant editor in the Food and Bioprocess Technology journal. He gained scientific experience at Canadian, Spanish, and Malaysian universities as part of scholarships, internships, workshops, and scientific consultations. During 5-month internship at the University of British Columbia (Vancouver, Canada), he conducted research on vacuum-microwave drying.

Ricky's Afterthought:

Solar power device captures carbon dioxide from the air to make sustainable fuel

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In this Issue I would like to inform our members of a major research activity headed by Fellow Johnian Erwin Reisner, Professor of Energy and Sustainability in the Yusuf Hamied Department of Chemistry at the University of Cambridge, on a solar power device that eventually produces sustainable fuel. Below we reproduce the article which appeared recently on the St John's College website:

Solar power device captures carbon dioxide from the air to make sustainable fuel

Cambridge researchers have developed a reactor that pulls carbon dioxide directly from the air and converts it into sustainable fuel, using sunlight as the power source.

The researchers, led by Professor Erwin Reisner (**Figure 1**), a Fellow of St John's College, say their solar-powered reactor could be used to make fuel to power cars and planes, or the many chemicals and pharmaceuticals products we rely on. It could also be used to generate fuel in remote or off-grid locations.

Fig. 1: Prof. Erwin Reisner.

Unlike most carbon capture technologies, the reactor does not require fossil-fuel-based power, or the transport and storage of carbon dioxide, but instead converts atmospheric CO_2 into something useful using sunlight. The results are reported in the journal, *Nature Energy* [1].

Carbon Capture and Storage (CCS) has been touted as a possible solution to the climate crisis, and has recently received £22bn in funding from the UK government. However, CCS is energy-intensive and there are concerns about the long-term safety of storing pressurised CO_2 deep underground, although safety studies are currently being carried out.

"Aside from the expense and the energy intensity, CCS provides an excuse to carry on burning fossil fuels, which is what caused the climate crisis in the first place," said Professor Reisner, Professor of Energy and Sustainability at the University of Cambridge. "CCS is also a non-circular process, since the pressurised CO_2 is, at best, stored underground indefinitely, where it's of no use to anyone."

"What if instead of pumping the carbon dioxide underground, we made something useful from it?" said first author Dr Sayan Kar from Cambridge's Yusuf Hamied Department of Chemistry. "CO_2 is a harmful greenhouse gas, but it can also be turned into useful chemicals without contributing to global warming."

The focus of Professor Reisner's research group is the development of devices that convert waste, water and air into practical fuels and chemicals. These devices take their inspiration from photosynthesis: the process by which plants convert sunlight into food. The devices don't use any outside power: no cables, no batteries – all they need is the power of the sun.

The team's newest system takes CO_2 directly from the air and converts it into syngas: a key intermediate in the production of many chemicals and pharmaceuticals. The researchers say their approach, which does not require any transportation or storage, is much easier to scale up than earlier solar-powered devices.

The device, a solar-powered flow reactor, uses specialised filters to grab CO_2 from the air at night, like how a sponge soaks up water. When the sun comes out, the sunlight heats up the captured CO_2, absorbing infrared radiation and a semiconductor powder absorbs the ultraviolet radiation to start a chemical reaction that converts the captured CO_2 into solar syngas. A mirror on the reactor concentrates the sunlight, making the process more efficient.

The team is currently working on converting the solar syngas into liquid fuels, which could be used to power cars, planes and more – without adding more CO_2 to the atmosphere.

"If we made these devices at scale, they could solve two problems at once: removing CO_2 from the atmosphere and creating a clean alternative to fossil fuels," said Dr Kar. "CO_2 is seen as a harmful waste product, but it is also an opportunity."

The team says that a particularly promising opportunity is in the chemical and pharmaceutical sector, where syngas can be converted into many of the products we rely on every day, without contributing to climate change. It is building a larger scale version of the reactor and hope to begin tests in the spring.

If scaled up, the researchers say their reactor could be used in a decentralised way, so that individuals could theoretically generate their own fuel, which would be useful in remote or off-grid locations.

"Instead of continuing to dig up and burn fossil fuels to produce the products we have come to rely on, we can get all the CO_2 we need directly from the air and reuse it," said Professor Reisner. "We can build a circular, sustainable economy – if we have the political will to do it."

The technology is being commercialised with the support of Cambridge Enterprise, the

University's commercialisation arm. The research was supported in part by UK Research and Innovation (UKRI), the European Research Council, the Royal Academy of Engineering, and the Cambridge Trust.

For further reading

1. S. Kar et al., Direct air Capture of CO_2 for Solid Fuel Production in Flow. Nat. Energy (2025). https://doi.org/10.1038/s41560-025-01714-y.

AMPERE's web project: Progress, improvements, and future

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AMPERE's website has continued to evolve, reaching significant milestones that reflect steady growth in both usability and audience engagement. We're excited to share the key elements driving our progress, along with new strategies that are shaping a more dynamic and user-focused platform.

Organized and Accessible Content

One of the most impactful improvements has been the reorganization of our content. Articles, resources, and updates are now grouped into clearly defined categories, making it easier for visitors to find exactly what they're looking for.

This structured approach not only improves navigation but also ensures that the right information is available to the right audience. By creating an intuitive and logical content hierarchy, we've minimized the time users spend searching for information while maximizing their satisfaction.

SEO: A Path to Greater Visibility

To ensure that our platform reaches as many people as possible, we've invested heavily in refining our search engine optimization (SEO) strategies. This includes optimizing keywords, improving meta descriptions, and improving page structures. The result? A noticeable increase in organic search traffic. More users are discovering our site through search engines, demonstrating the power of tailoring digital content to align with search algorithms while maintaining a user-first approach.

A Growing and Engaged Audience

Our analytics continue to show a steady increase in real visitors (those who actively interact with the platform). The most popular sections (currently the pages "Homepage", "Events", "About Us", "Newsletter", and "Issue 120") show that our content resonates with users' interests.

Advanced tools like Matomo allow us to dive deeper into user behavior, giving us insights into how visitors navigate the site, how long they stay, and what keeps them coming back. These data-driven improvements ensure that our platform remains relevant and engaging.

The graph below (**Figure 1**) compares the website's organic visits from September to those in October, highlighting a clear improvement over time.

The data below (**Figure 2**) provides a comprehensive overview of the website's performance over the two months in question. It shows not only an increase in the frequency of visits and the number of users but also a growing interest in the content, which has successfully reached a wider audience.