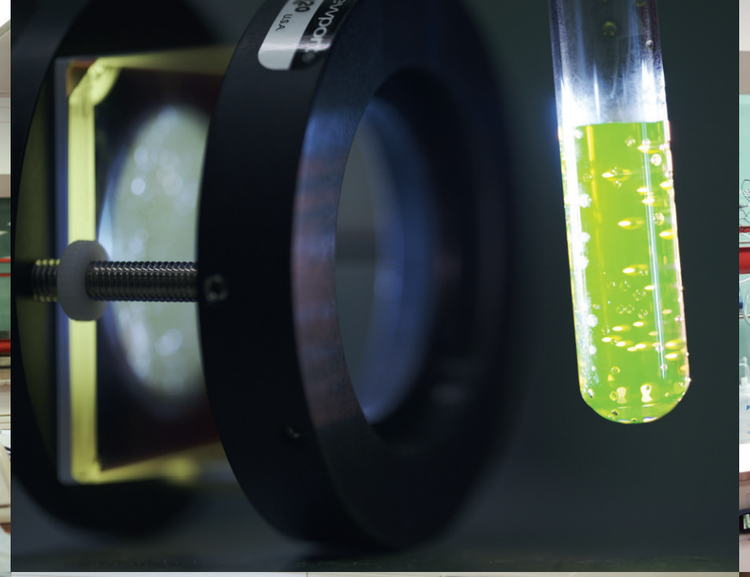
They are researching a sustainable way to produce syngas: Professor Erwin Reisner and his international team in the Christian Doppler Laboratory in Cambridge.

BETWEEN CAM AND CHEMISTRY

Lush green lawns in front of the old, dignified walls of the colleges with the Cam flowing smoothly between them. At the edge of Cambridge, a traditional university town, a new scientific subject is being researched in the Christian Doppler Laboratory for Sustainable Syngas Chemistry, which is supported by OMV: The efficient use of carbon dioxide (CO2) and water (H2O) for future mobility. move pays a visit.





Erwin Reisner (3rd f. r.) and his team in Cambridge.

The day is overcast. And at first we also struggle to find clarity in the fog of complex chemical processes that will economically extract syngas. Luckily we meet the young, enthusiastic chemist Manuela Groß from Austria and her English colleague David Wakerley from the international seven-person team led by Dr. Erwin Reisner, head of the Christian Doppler Laboratory for Sustainable Syngas Chemistry. Both doctoral candidates make great efforts to explain their work clearly. "It is an extremely exciting field of research that allows room for creativity. Today, syngas – a gas mixture of carbon monoxide (CO) and hydrogen (H2) – is extracted from fossil fuels in a non-renewable process. We are working on a sustainable, 'green' option that will utilise sunlight to convert carbon dioxide (CO2) and water (H2O) into syngas. Working on such an interesting industrial project is a rare opportunity as a doctoral student," explains David Wakerley, and Manuela Groß adds, "I really like the thought of researching such a future-oriented subject here."

»The commercial potential of syngas is enormous. It is a valuable raw material for the petrochemical industry and can be converted into liquid fuel like gasoline, diesel, and kerosene.«

Erwin Reisner, head of Christian Doppler Laboratory for Sustainable Syngas Chemistry

GREEN FUTURE IN A TEST TUBE

Erwin Reisner and his team are pioneers who know that their research could make an important contribution to a carbon-based renewable energy economy. At this point, a future scenario can be imagined: "Who knows, maybe we will all be driving with green fuels produced from sunlight in 2050. The potential for the commercial use of syngas is enormous, because it is a valuable raw material for the petrochemical industry. And it can already be converted into liquid fuel like gasoline, diesel, or kerosene through the Fischer-Tropsch process. This, in turn, is an interesting economic factor for companies like OMV, that are very interested in developing and researching sustainable sources of energy and energy carriers," says Erwin Reisner.

The hierarchies are flat and the researchers are young and full of ideas. At the historic university – founded in 1209 – the most advanced projects are being researched. Interdisciplinary work and friendly cooperation define the atmosphere in the Christian Doppler Laboratory at Cambridge. For Erwin Reisner, international diversity was a fundamental factor when selecting his team. Now seven researchers from all around the world can share their experiences while researching syngas. The young researchers have come together from Taiwan, Korea, Germany, Canada, England, and Austria. "We also like to spend time together outside the lab," tells Manuela Groß. "Sometimes the lines between work and leisure time are blurred. And that's a good thing, because for some chemical processes there's no such thing as a weekend."

A DIFFERENT KIND OF WATER-SPLITTING

Even when the experiments are incredibly exciting, the researchers still need a change once in a while, and life in a town with such a rich past and lively present has a lot to offer – "Cambridge is an international village." The residents of the 31 colleges, among them well known institutions like Trinity College (founded in 1546), St. John's College (founded in 1511), and King's College (founded in 1441), have a clear favorite when it comes to recreational activities: "Half of Cambridge rows! The annual boat race of the university eight rowers between Cambridge and Oxford is world famous," says the Austrian student, who likes to spend her free time on the Cam, and David Wakerley adds, "Or we meet for a 'formal dinner', a festive meal together at the college. Many students play music, perform in plays, or just spend an evening in the pub." These are the same colleges and pubs that were also visited by generations of highly talented researchers before them. The University of Cambridge has produced more Nobel Prize winners than any other university in the world, among them one female chemist and 21 male chemists. Even though it will take some time until carbon dioxide can be made efficiently usable, we are happy to know that this important project is in the best hands (and heads). ◄

ACTIVATOR: SUNLIGHT

The use of CO2 is still a relatively new scientific subject. Erwin Reisner and his team are doing fundamental research in this field. They are working on the ecological and economic production of syngas, an important raw material for the petrochemical industry. Their approach is to convert syngas – a gas mix of carbon monoxide (CO) and hydrogen (H2) into a renewable and carbon neutral process using solar energy. However, this process only makes ecological sense if the syngas is not produced from fossil fuels, as it has been until now, but instead from carbon dioxide and water (CO2 and H2O). The inspiration comes from the biochemical processes of photosynthesis in plants, where the enzymes that act as a catalyst in this process produce hydrogen (H2) and convert carbon dioxide (CO2) into carbon monoxide (CO). "Inspired by the photosynthetic enzymes responsible for what happens in plants, we are researching cost-effective synthetic catalysts based on iron, nickel, or cobalt. We are looking for a catalyst that allows us to convert almost the entire 'load' into fuel if possible. And to do this we want to use a practically free energy carrier – the sun," says Erwin Reisner. Making these synthetic catalysts for syngas production is one of the team's greatest scientific challenges.

In Cambridge, where the fuels of the future are being researched, the bicycle is a close second to the rowing boat as thepreferred mode of transportation.

»Half of Cambridge rows! The annual boat race of the university eight rowers between Cambridge and Oxford is world famous.«

Manuela Groß, doctoral candidate in Christian Doppler Laboratory for Sustainable Syngas Chemistry

SUSTAINABLE FUEL?

As an integrated oil and gas company, OMV is very interested in supporting and researching alternative, sustainable energy sources and energy carriers. That is why, as the only industrial partner, we contribute 50 percent to the "Reisner Lab" research project for sustainable syngas chemistry. OMV's commitment to establishing energy cycles of the future and finding innovative win-win solutions is an important building block on the road to reducing greenhouse gases by 2050. The fundamental research project will run for seven years in total and is being supported as part of OMV Resourcefulness, Eco-Innovation.

Erwin Reisner

Originally from Upper Austria, Erwin Reisner studied at and earned his doctorate from the University of Vienna's Institute of Chemistry. His career path led him from Massachusetts Institute of Technology (MIT, USA), to the Universities of Oxford and Manchester, and finally to the University of Cambridge (GB). He has been head of the Christian Doppler Laboratory for "Sustainable Syngas Chemistry" at the Chemistry department of the University of Cambridge since April 2012.