

AZO
MATERIALS



CHEMUK2023

SUPPLY CHAIN • PROCESS & PLANT • LABORATORY

10th & 11th May 2023, NEC, Birmingham, UK

HIGHLIGHTS FROM 2022



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Promoting Sustainability in the Lab



Interview conducted by Skyla Baily

May 3 2022

Thought Leaders

Jacqueline Balian / Martyn Fordham

Head of Laboratory Development / Head of Product Development
Gambica / Asynt



Ahead of their talk on green chemistry and profitability in laboratory research at ChemUK 2022, AZoM spoke with Jacqueline Balian from Gambica and Martyn Fordham from Asynt about encouraging sustainability in the chemical industry.

Please can you introduce yourself and your professional background, as well as your current role?

Jacqueline Balian (JB): Hi, my name is Jacqueline Balian. I've worked in professional associations for many years, mainly in the energy efficiency field, and I also spent an interesting period running the Renewable Heat Incentive for the Government. I am now head of the lab sector at GAMBICA, a small UK trade association for companies in the lab, automation, and testing industries.

Martyn Fordham (MF): I'm Martyn Fordham, Managing Director at Asynt. I have been involved in the custom design of chemistry apparatus since 1983.

What are some of the advantages that come with encouraging sustainability in a lab environment?

JB: Labs are enormous users of energy and substantial producers of plastic waste but are also at the forefront of finding solutions to our present sustainability problems. They present the epitome of the ticklish issue of what to do when you have to keep increasing your outputs while reducing your consumption. But they also have the most motivated and able people who can and will engage with the problem and find solutions – it's what they are all about.

The advantages for the labs themselves are satisfying staff demand, satisfying client

demand, and improving their bottom line.

MF: Saving money and increasing efficiencies are often the results of sustainable technologies for synthesis laboratories.

The Gambica trade association will be represented by Asynt at the ChemUK conference in May. What does Asynt do and how is it implementing strategies toward greener lab work?

MF: We design and manufacture apparatus for research chemistry laboratories. The majority of our products have an added advantage in terms of increasing sustainability as well as some significant safety improvements.

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You will be conducting a talk called ‘The Lean, Green, Profitability Scene’ at ChemUK. Could you describe the relationship between green chemistry and profitability?

JB: We have a big, big task ahead of us to avoid a climate catastrophe and limit the effects of what we have already done. We cannot afford to have any sector lag behind in the race to zero, but important, heavy energy users like R&D labs need to lead the way. They need to be able to purchase equipment and consumables and carry out their operations so as to reduce the burden they place on the planet, but the flip side of that is that everything they save by doing so, goes straight onto the bottom line.



Jacqueline presenting at ChemUK 2021

It's like lean engineering, sustainable laboratories will improve their processes and in turn cost less and therefore increase profitability. Better designed and run experimentation will reduce time to market and improve profits and the excellent work being done on the automation of laboratories will certainly also allow labs to cut down on unnecessary waste.

Perhaps one of the greenest innovations however is the improved use of LIMS and other data systems to improve the use of existing data to cut down on unnecessary repetition of work and identify trends to help hone processes by means of modeling rather than

experimentation. This is not only a greener option, but it also cuts costs too.

MF: To successfully introduce sustainable improvements to a laboratory, these improvements should also reduce running costs and improve the working environment for the chemist.



Martyn at ChemUK 2021

What kinds of technologies can be used to increase the sustainability of lab processes in the research chemistry laboratory?

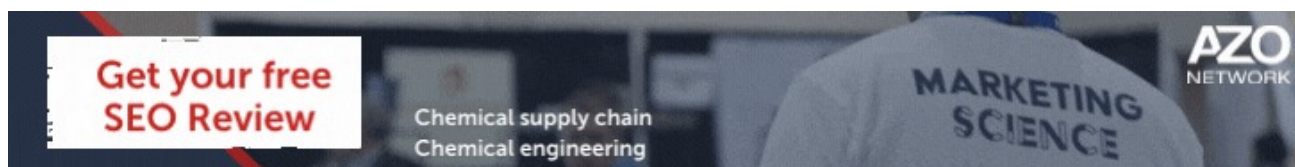
JB: In our session, delegates will hear about technologies that replace plastics with sustainable alternatives, about products that reduce the need for water or which inherently produce less waste, they will also hear about new markets which may be opening up to them in the re-use of waste materials.

MF: Waterless condensers (our CondensSyn) reduce water consumption. As well as these, lower power usage heating tools (our DrySyn), photochemistry (enabling research into using more sustainable solvents, particularly important when scaled up), flow chemistry tools (similar benefits for photochemistry) and products that maximize recyclable materials such as aluminum can be employed.

With the halt of in-person events such as ChemUK over the last two years due to Covid-19, how important are conferences like these for stressing the importance of sustainability in industry?

JB: People are certainly keen to get out and about and events like this can provide inspiration, excitement, interest, and a break from the old routine. But moves to sustainability are not straightforward - often people do not understand the first steps to take. Events like Chem UK can help. Leadership is hugely important in sustainability. Events like Chem UK can help provide the inspiration and ideas people need to lead their companies into a green transition.

MF: The exhibition element is key for scientists to see what is new to the market in terms of sustainable, cost-saving, and time-saving tools.



About Jacqueline Balian and Martyn Fordham

Martyn has been working in the Chemistry field for over thirty years, going on to form Asynt Ltd in 2003. With a custom glass blowing background, Martyn has been involved in many product development programs, both for previous employers and now of course Asynt and Uniqsis of which Martyn is also founder and CEO. Martyn is head of product development within Asynt and is keen to expand the portfolio of products available with innovative and useful new tools for the laboratory.



Jacqueline is head of the lab, test and measurement sectors at GAMBICA which she joined after a career spanning journalism, running energy efficiency and renewable energy schemes and working in professional bodies.



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Written by

Skyla Baily

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The Key Role of Raman Spectroscopy in Industrial Processes



Interview conducted by Skyla Baily

Apr 11 2022

Thought Leaders

Kevin Fernandes
Process Analytical Sales Engineer
Endress+Hauser Ltd



AZoM spoke to Kevin Fernandes from Endress+Hauser about the significance of online Raman spectroscopy in industrial processes, as well as its potential role in emerging industries.

Please can you introduce yourself and your professional background within analytical chemistry, as well as your current role at Endress+Hauser?

I've always enjoyed working in the lab right from school. I started working for Thames Water in 1977 as a lab assistant on water treatment works, and then worked in pharmaceutical research with GlaxoSmithKline. During this time, I also studied part-time for the Ordinary National Certificate in sciences through to a degree level.

It was at this point that I moved into the commercial world as a sales engineer for Varian Chromatography Instruments and became a product specialist for a range of consumables, helping customers with their method development protocols.

Prior to joining Endress+Hauser, I held several business development roles that included liquid handling, supercritical fluid chromatography, high throughput synthesis chemistry, and the application of electrochemistry to High-Performance Liquid Chromatography (HPLC).

My current role at Endress+Hauser covers the UK as a process analysis sales engineer for optical spectroscopy instrumentation. This includes sales and support of Raman Spectroscopy and Tunable Diode Absorption Laser (TDLAS) instruments.

Endress+Hauser is a world-leading provider of measurement instrumentation and solutions for industrial process engineering. How essential is measurement instrumentation to industrial chemical processes?

It is vitally important, as analytical technologies are the window into the process. Online analysis as opposed to offline or remote facilitate rapid decisions and can contribute significantly to process efficiency, better utilization of plant assets, and ultimately, the bottom line.



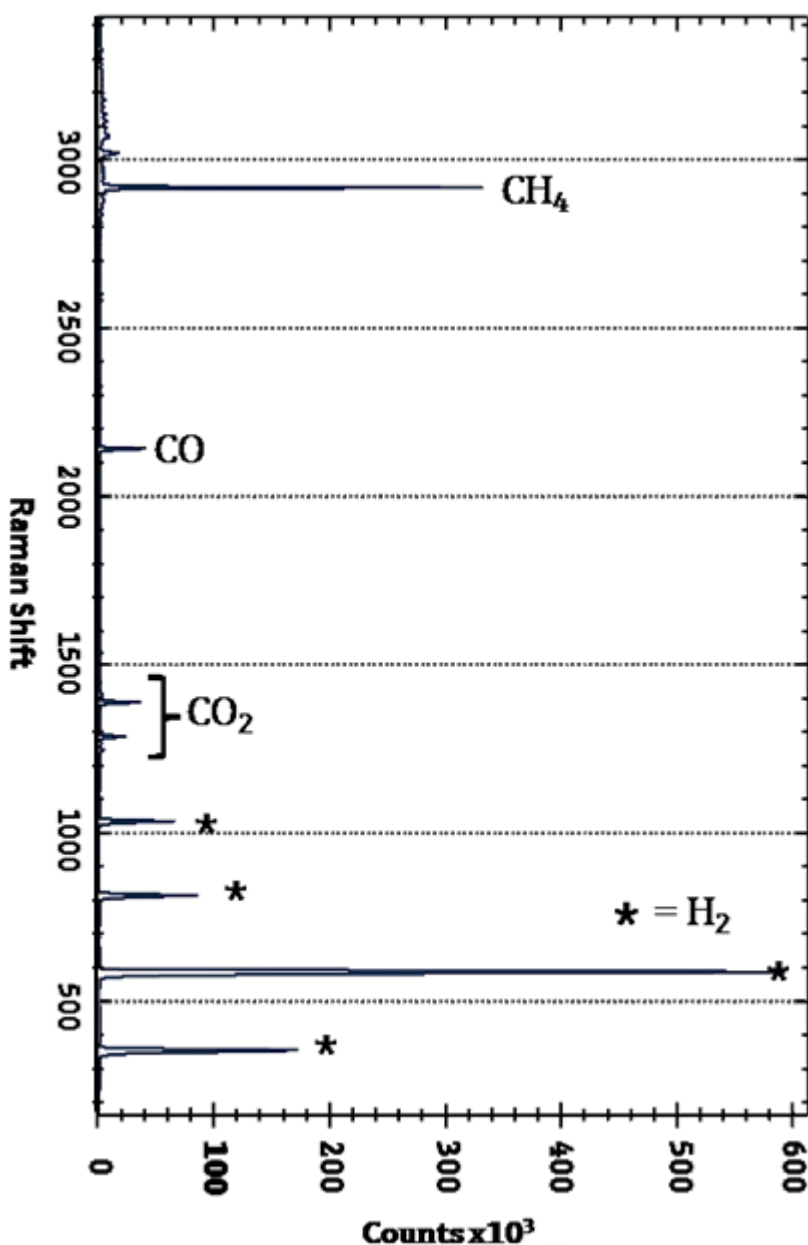
Image Credit: Forance/Shutterstock.com

Could you please provide an overview of what Raman spectroscopy is as well as its various industrial applications?

Raman spectroscopy is a light scattering technique. Raman utilizes a high-intensity light source from a laser, usually supplied by a fiber optic cable to the sample of interest. Most of the scattered light will be at the same wavelength as the laser—this is known as Rayleigh

scatter, and photons of this type will be filtered off.

However, some of the backscattered light will change wavelength or color. This is called the Raman scatter and this will represent what we want to measure. The Raman spectrum, as such, can show several peaks demonstrating their intensity and wavelength position. Peaks in a Raman spectrum correspond to a molecular vibration; for example, these can be C-C, C=C, N-O.



Raman Spectra of a simple Gas Mixture

Raman spectroscopy allows online optical analysis to bridge the gap between lab and process. How is this possible and in what ways is this advantageous?

Lab to process is very much a mantra of Endress+Hauser. What this means is that analytical methods developed in the lab can be seamlessly integrated into the process and become an integral part of it rather than a remote or discrete one - the lab comes to the sample. To get this set up, the introduction of a Raman light source just needs a probe connected to the process in question—the probe itself can be changed to accommodate many different sample types, for example gases, liquids, slurries, and powders.

The Raman hardware is robust, and all the software is integrated so there are no requirements for additional computers. Data transfer to the most commonly used control systems is easy due to OPC and Modbus protocol outputs. When the process is monitored, online results are continuous and in real time, which allows for changes to the process to be made on the fly, meaning there are no delays waiting for results to come back from the laboratory.

To put this into context, applying Raman spectroscopy to advanced bioprocesses would generate a control saving of around £5,000 on a typical 6,000 litre vessel by not having to include offline analysis. Furthermore, the risk of compromising bioreactor sterility is also removed by not having to sample the vessel periodically and invasively. Chemometric models developed in the lab also allow for convenient method transfer and allow the scaling up of process levels.

You will be conducting a talk on Raman spectroscopy at the 2022 ChemUK conference in May. What can visitors expect from your presentation?

My talk will provide a quick overview of the Raman technique and technology, focusing on some of the applications that we have developed at Endress+Hauser and how these have been implemented into our markets such as the manufacturing of chemicals, oil and gas production, and bio/pharmaceutical production.

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What role will Raman spectroscopy play in emerging industries such as clean energy and green chemistry, and what benefits will implementing this analytical technique have?

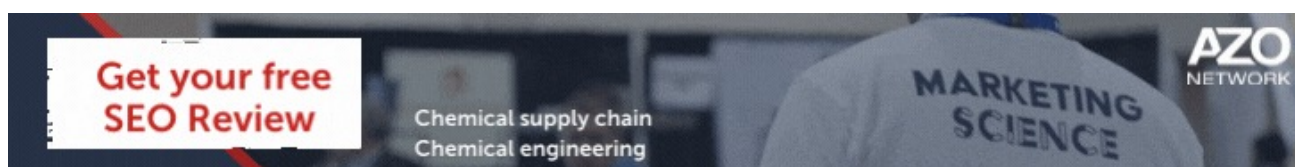
Nice question! Endress+Hauser Raman is already playing a part in monitoring the purity of green and blue hydrogen etc. from processes such as electrolysis and steam reformation of methane. Raman has also been integrated with other Endress+Hauser instrumentation to provide a complete solution for this very important application. In addition to this, Endress+Hauser TDLAS instrumentation is being used to measure compounds such as moisture and carbon dioxide in hydrogen streams and carbon capture projects.

What does the future of measurement instrumentation look like to you? Do you expect this technology to evolve much in the years to come?

The measurement aspect of the process will increasingly become more integrated, and although the instrumentation footprint in a plant will get smaller, it will become increasingly more information-rich.

After the halt of many in-person conferences due to the ongoing COVID-19 pandemic, how important are conferences like ChemUK for developing and sharing ideas within industries?

Online platforms like Teams and Zoom are still great for pulling people together, particularly at short notice. However, nothing in my opinion beats having face to face meetings to conduct business. To that end, conferences like ChemUK are invaluable to provide those platforms.



Further Information:

<https://www.endress.com/en/endress-hauser-group/product-center-competencies/optical-analysis>

www.uk.endress.com

www.rsc.org

Process Raman Spectroscopy Selected Application Notes

Chemical Process

- Monitoring polymerization reactions.
- In-line monitoring of ethylene vinyl acetate Copolymer with Raman spectroscopy
- Raman spectroscopy in the chemical industry.

Oil and Gas

- Process Raman Spectroscopy for custody transfer operations of ship to ship and ship to shore Liquefied Natural Gas (LNG) cargoes.

Life Science

- Advanced process and product control in fermentations. Raman spectroscopy for composition analysis in a lab or process
- Raman spectroscopy For bioprocess applications
- Raman spectroscopy simultaneously measures several parameters in-situ real-time monitoring bioprocess.

About Kevin Fernandes

I'm currently employed as a Process Sales Engineer by Endress+Hauser Ltd in the UK, providing sales support for our laser-based spectroscopy instrumentation which includes Raman and Tunable Diode Laser Spectroscopy Instrumentation.

I'm very privileged to have a career in the field of natural sciences, from the lab bench to the commercial world where I now reside. Career highlights include the development and bringing to market of many new and innovative technologies in the analytical world. My old chemistry teacher told me: *"you spend a long time working, so do something you are going to enjoy."* Wise words that still hold true today.



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Written by

Skylia Baily

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The Relationship Between Lubrication and Green Chemistry



Interview conducted by Skyla Bailly

Apr 1 2022

Thought Leaders

Jonathan Venditti
Head of Global Chemical
Klüber Lubrication



AZoM spoke to Jonathan Venditti from Klüber Lubrication about the significance of lubrication in chemical processes, and how a focus on these products can contribute toward greener industrial chemistry.

Please can you introduce yourself and your professional background in chemistry, as well as your current role at Klüber Lubrication?

My name is Jonathan Venditti and I was born in Montréal, Canada, where I also completed my studies in Chemistry and Business Administration. I did an internship at a small lubricants manufacturer while I was doing my chemistry degree and I quickly fell in love with the tribology concept and all its topics.

From quality control to formulation chemist and technical advisor... I always stayed in the lubricants industry but moved on into more sales-oriented roles. I am now responsible for the Chemical Industry sector at the headquarters of Klüber Lubrication in Munich, Germany. I collaborate with my worldwide colleagues to provide chemical companies with lubrication solutions to improve the reliability, efficiency, availability, and safety of their processes.

Klüber Lubrication is a leading supplier of quality lubricants for industrial processes. How important is the reduction of friction and wear to the everyday operation of industries like the chemical industry?

The chemical industry is still using a lot of mineral oil-based lubricants for high energy consumption applications. These conventional lubricants are cost-effective, but only at the

initial purchasing stage, as in the middle or long-term, they offer a poor coefficient of friction, bad viscosity behavior across temperature ranges, and are subject to oxidation.

Friction is the worst enemy of efficiency. Klüber Lubrication has proven in more than 300 cases that moving away from mineral oils to adopt specialty synthetic lubricants can save up to 7% of energy cost on some applications like Compressors, Pumps, Gearboxes, and Hydraulic systems. The chemical industry strives to find innovative solutions to reduce its GHG (Green House Gas) emissions and improve the efficiency of its processes. Therefore, lubrication optimization should be one thing they should consider to reach their sustainability targets.

You will be conducting a talk on the role of lubrication in green chemistry at the 2022 ChemUK conference in May. Could you define what is meant by ‘green chemistry’?

Green Chemistry, also known as Sustainable Chemistry, was initially developed by Paul Anastas as a response to the Pollution Prevention Act of 1990. This concept includes 12 principles that encompass topics like sustainability, efficiency, safety, and the circular economy. It is basically guidelines encouraging chemical companies to adapt their activities or behaviors to have less impact on us now as well as future generations and planet Earth.

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How significant is the issue of energy and fossil fuel consumption in the chemical industry?

The chemical sector is responsible for almost 10% of the global energy consumption and close to 30% of the total industrial energy consumption. This issue is real and significant as a lot of chemical companies need fossil fuels for their processes, with no alternative to replace this feedstock. Some production sites use fossil fuels as a primary source of energy to run gas turbines at their power plant.

How can a focus on lubrication reduce the climate impact of chemical manufacturing?

Optimizing lubrication has a direct impact on the energy efficiency of machines. By monitoring improvements in the field, we are able to quantify savings according to ISO 50015 and the International Performance Measurement and Verification Protocol to support energy management systems e.g. ISO 50001.

Besides effective lubricant use in machinery, what other steps can be taken to increase efficiency?

I would say the quality, modernity, and technology of the machinery account for a lot. Modernization and replacement of old machinery is often a useful way to improve efficiency in a production plant. Taking good care of the lubricant itself will also be good for maximum efficiency. It is important to keep lubricants cool and without moisture or other contaminants.



Image Credit: Tony Duy/Shutterstock.com

How must the production of lubricants also adapt to new efforts to minimize emissions?

The production process is one of the important things, as it can directly influence the

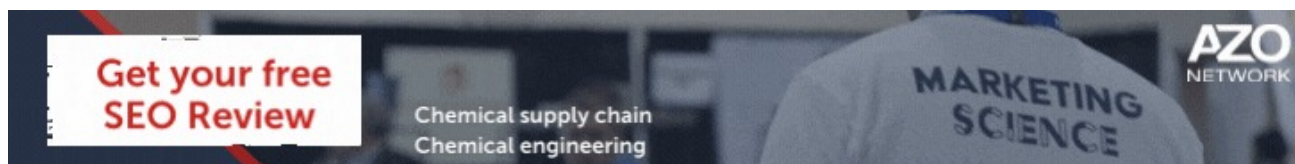
performance of lubricants. However, the biggest contributors in our fight against friction and our success in reducing emissions at the customer site are our R&D and tribological departments. This is where the magic truly happens. Our specialists are simulating real-life applications on test rigs and go as far as developing new types of base oils so that our new innovative lubricants can reach unrivaled levels of efficiency.

Bearing in mind industry-wide efforts to move toward green chemistry, how do you anticipate chemical processes will change in the next five to ten years?

With the constant increase in energy costs and the environmental legislation becoming stricter, I think chemical companies will have no choice but to invest in renewable energy installations or pollution prevention technology like post-treatment systems and carbon recovery units. Lubrication improvement is still a smart choice to start with and represents a fairly small investment.

After the halt of many in-person conferences due to the ongoing COVID-19 pandemic, how essential are conferences like ChemUK for encouraging discussions around climate action?

Nothing can replace a real and live event. During webinars, most people are too shy to interrupt ongoing discussions to ask questions. Conferences like ChemUK are a lot more interactive, and connecting to people you share interests with is easier face to face. As a consequence, discussions on topics like sustainability and efficiency can be taken to the next level by actively sharing experiences and opinions with other people in the same room. I hope to pique the curiosity of some people and potentially encourage some good exchanges on the topic of green chemistry.



About Jonathan Venditti

Born in Montréal, Canada, and now living in Munich, Germany, Jonathan's scholarship background is in Chemistry and Business Administration. He has been working for over 15 years in the industrial sector as a lubrication and tribology specialist, fighting wear and friction on a daily basis. Troubleshooting issues, improving reliability/efficiency and developing new innovating products for specific applications are his strengths. He is currently responsible for the Global Chemical Industry Market at Klüber Lubrication.



<https://www.klueber.com/global/en/industry-solutions/industry/lubricants-chemical-industry/>

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How Can Valve Diagnostics Reduce Emissions in the Chemical Industry?



Interview conducted by Skyla Baily

Apr 26 2022

Thought Leaders

David Anderson
Director
Score Diagnostics Ltd



AZoM spoke to David Anderson, a director at Score Diagnostics Ltd, about the role valve maintenance and diagnostics play in efforts to reduce emissions in the chemical industry and make industry as a whole greener.

Please can you introduce yourself and your professional background within valve diagnostics, as well as your current role at Score Group?

I am David Anderson, a Director at Score Diagnostics Limited, the Score Group company that is focused on valve condition and performance monitoring and diagnostics. I have worked in the valve industry throughout my 38-year career, 28 of which have been within the Score Group. I have been involved in Valve Diagnostics for over 20 years fulfilling various roles.

I am currently focused on the roll-out and support of our unique valve condition and performance monitoring equipment/systems/technologies, as well as our Emissions Elimination Program, to our customers worldwide.

Score Group is a global company specializing in valves, fuel systems, and component manufacture. How essential are efficient valves and valve diagnostics to chemical processes?

Valves are one of the primary control elements in chemical processes / fluid flow management and they most often perform critical functions such as safety management, environmental stewardship, or impact directly on process efficiency and uptime. Knowing, in

advance of any in-service failure, that a valve is likely to not be able to perform its intended function is therefore critical to achieving a safe, environmentally sustainable, and efficient process operation.

The critical valve diagnostic evidence our manufactured equipment and systems provide guides process owner/operators on what proactive and pre-emptive maintenance activities are required, to ensure no in-service failures and no unplanned/unexpected process downtime is experienced.

You will be conducting a talk on reducing emissions within the chemical industry at the 2022 ChemUK conference in May. Why is it so important that steps are taken to make this industry greener?

It is well documented that pressure is being exerted on process owners/operators to take all reasonable and responsible steps to reduce any potentially harmful impacts to the environment. This is not just coming from activists, it is coming from governing bodies and other associated authorities. In taking the required steps towards optimized environmental stewardship, process industry stakeholders will ensure their business operations remain sustainable moving forward.

Whilst some of the pressure is coming in the form of prescriptive compliance requirements, it should be further highlighted that the potential gains available from optimized valve management will deliver very attractive benefits to owner/operator organizations too. It should therefore be our primary focus to accelerate the uptake of innovation and technologies that deliver these operational outcomes and benefits. The outcome of these positive actions will automatically make operations greener.

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As well as mitigating the effects of climate change, what are some of the other positive benefits that can be associated with emissions reduction?

As mentioned above, there are many motivations for process owners/operators to get involved in reducing emissions (or as we would prefer to focus on, *eliminating* emissions). I have previously published guidance for process owners/operators on the following positive outcomes that can be delivered by in-line condition and performance monitoring of valves:

- Minimize Risks and Improve Process Safety
- Minimize Risks and Improve Personnel Safety
- Maximize Process Efficiency
- Minimize (Avoid) Production Losses
- Maximize Process Operating Profits
- Improve ESG Reputation

Since these are all key performance indicators and highly desirable business objectives for our customers, they can also be identified as strong drivers for change and for the rapid adoption of any technologies that deliver these outcomes.

What role does the condition of valves and other assets play in emission reduction strategies?

According to a UK government report, industry represents nearly a quarter of UK emissions. Within process industries, Valves have been identified as the biggest source of emissions - whether these be through-valve leaks (leading to vents and flares) or fugitive emissions (from gland packings, joints, etc.). Based on independently published research, around 75% of process emissions are being released from valves and adjoining pipework.

Valves are therefore the primary (although not the only) target in our strategic Emissions Elimination Program. When valves are installed and functioning correctly, emissions are significantly lower. We must therefore put our collective efforts into optimizing valve performance management, to ensure the maximum reductions in emissions are achieved, in the shortest possible timescale.



Image Credit: industryviews/Shutterstock.com

Within your talk at ChemUK, you will cover the four critical elements of effective emissions elimination—could you briefly outline what these four elements are?

The four key steps of our Emissions Elimination Program will be clearly identified as :-

1. Survey; Finding the valves that are not performing as required within the process (the leakers!). We also have the ability to monitor valve conditions and performance over time.
2. Analyze; A detailed review and interpretation of the survey findings, which evidence and prioritize the required repair and maintenance activities
3. Reduce; Mitigating leaks in the first instance through temporary or permanent repairs, which may also include recommending design modifications or different materials supported by our extensive valve engineering capability.
4. Eliminate; Ensure the principles of continuous improvement are applied to improve valve performance and expected life cycles moving forward

These follow the basic principles of Intelligent Valve Management™ practices and are fully aligned with what we have learned and implemented at Score Group over the last 40 years.

What more can listeners expect from your talk in May?

We will be describing some of the leak detection, quantification, and valve repair technologies we deploy, and the benefits we have delivered to our customers in the case studies section of the presentation. Focusing on the key performance indicators that most chemical companies will already be measuring and then showing how these can be improved is the key to accelerating the adoption of the technologies that support emissions reduction efforts. The “return on investment” models are compelling.

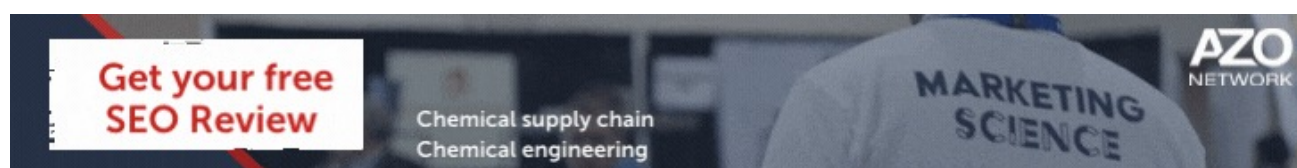
Overall, how achievable do you believe net zero emissions targets are within the chemical industry?

I do believe that net-zero emissions are an achievable target. Now that much of the correct investment has started, it is somewhat inevitable that emissions from process industries will reduce over time. As scope 1, 2, and 3 emissions come clearly into everyone’s focus and become better understood and measured, there will be an increasing appetite and ownership among process owners/operators to address these and achieve the lowest possible operating emissions.

This transition will inevitably then move the reduction targets which are set, just as we have seen in the USA market, where compliance standards have become increasingly stringent over time. By working together, all stakeholders can achieve the best possible outcomes – this may even take us to a position beyond today’s simple “net zero” aspirations.

After the halt of many in-person conferences due to the ongoing COVID-19 pandemic, how important are conferences like ChemUK for encouraging collaborative efforts to make industries greener?

Given that it takes all of us working together to fix the biggest problems, we need these collective and collaborative events - like Chem UK - which allow innovators and entrepreneurs to share creative solutions and energize the market to make the positive changes required, to ensure our industry remains sustainable for many years to come. Simply repeating what we have done in the past is not sustainable.



About David Anderson

In my global role as a champion of MIDAS® Valve Diagnostics products and services, I am proud to have directly contributed to reducing emissions in more than 30 countries, through the deployment of our unique valve condition and performance monitoring equipment and systems such as MIDAS Meter®, MIDAS® Sensor, V-MAP® and V-MAP® Portable. Full details for these Score Group products and our wider Emissions Elimination Program can be found at our website

www.midasvalvediagnostics.com or www.score-group.com.

Alternatively, we would be delighted to welcome you to our exhibition stand at Chem UK – You will find us on stand number C20. Come and have a chat about how we can directly help you.



Please also feel free to connect with me on LinkedIn, at [David Anderson, FloD \(Dip\), CQP, MCQI, MIAM | LinkedIn](#)

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Creating Sustainable Textiles From Seaweed



Interview conducted by Skyla Baily

Apr 6 2022

Thought Leaders

Anna Watkins
Director
Uncommon Alchemy



AZoM speaks with Anna Watkins about her business Uncommon Alchemy, which is developing an exciting novel textile material made from seaweed.

Please can you introduce yourself and your research/professional background?

I'm a material innovator working on sustainable materials for the fashion industry. My company, Uncommon Alchemy, is currently developing a 100% biobased alternative to leather, made using seaweed as the main raw material.

What inspired you to begin researching and developing new materials?

I come from a creative background in fashion/textiles, and during my undergraduate degree I realized that what really interested me about textiles was the materiality of it rather than the garment design itself. I became really frustrated with the lack of sustainable materials available and felt that in a lot of cases, choosing a so-called "sustainable" option resulted in too much compromise.

I started researching biomaterials, found some open-source recipes online, and began experimenting. I fell in love with the process and started developing my own materials. I've been developing seaweed leather ever since.

The fashion and textile industry has become notoriously unsustainable. What are some of the key issues that we need to tackle in this sector?

As with all sustainability issues, there's not one simple answer. In my practice, I focus on using natural raw materials, green chemistry, and adopting circular principles. Raw materials and biodegradability are one part of the problem, but from a wider perspective, what we really need is system change throughout the fashion industry. We need better raw materials *and* better ways of capturing and reprocessing waste – innovation needs to happen across the value chain. We also need to find better ways of communicating with consumers about sustainable options.

We need to communicate that sustainability is not about making one perfect choice, but rather that it is a set of decisions that are complex and subjective – and then, of course, we need to equip consumers to make those decisions based on the facts. The bright side is that there is loads of really exciting work going on across all aspects of the fashion industry, and a lot of push from consumers and industry to fix these problems.



Image Credit: Uncommon Alchemy

You have developed a novel material that uses seaweed to produce a high-quality textile. What are the properties of the material?

Seaweed leather is being designed to perform to the same standards you'd expect from

any other fashion leather alternative – so for end consumers, that means being aesthetically attractive and standing up to the rigors of day-to-day use. For brands, that means acting as a direct substitute in their current manufacturing processes.

One of the great things about this material is that it is highly customizable in terms of color and texture, so the design possibilities are endless. And unlike most other leather alternatives, it will also be fully biodegradable when it reaches its end of life.

What are the environmental benefits of your novel textile?

The benefits start with the raw material itself – seaweed. Seaweed plays a vital role in ecosystems and actually has bioremediation effects: it captures carbon and it can also absorb nitrogen and phosphorous from eutrophied waters. Seaweed can help to mitigate wave energy, which can aid in preventing coastal erosion, and it can also provide sheltered habitats for marine wildlife. Cultivated and harvested properly, it benefits the environment and provides a versatile bio-source for materials like this one.

When it comes to the material itself, there are also several benefits. The type of seaweed we use can be processed using safe, green chemical processes, and the end result is a biodegradable, non-toxic material. We are also looking at ways to re-use waste from the process to make the system circular.

How does material from seaweed compare to vegan leathers and other materials that are described as sustainable?

Animal leather has a lot of environmental problems, which I think people are becoming more aware of. There's a growing market for 'vegan' leathers, but I think a lot of people don't always realize that typically, that just means petrochemical plastics instead. There are lots of exciting things going on in the biobased leather market, but again, lots of these materials are marketed as biobased but it's not always clear to the consumer that many of the plant-based vegan leathers contain polyurethane as a binding or coating agent.

Even when that PU is plant-based, it can still be hard to recycle and it means that they're not fully biodegradable. Seaweed leather aims to be 100% biobased and well as fully biodegradable, solving this problem whilst coming from a regenerative resource.



Image Credit: Natalia Lisovskaya/Shutterstock.com

You were named one of Innovate UK's Young Innovators and spoke at ChemUK in 2021 about your project. How did it feel to be recognized for your work and to be able to spotlight your achievements on these platforms?

This started as a passion project for me, cooking up slime in a saucepan in my student flat. It's come such a long way since then, as I've become more and more interested in scaling up and technical development. The Young Innovators Program (run by Innovate UK and KTN) has been such an amazing opportunity and completely changed how I do things – it's

given me a roadmap to commerciality for this material. [ChemUK](#) was brilliant because it was the first time I'd presented my work to industry. These kinds of things validate what I'm doing, and show how far it's come.

Are there any limitations of this material that are still to be overcome?

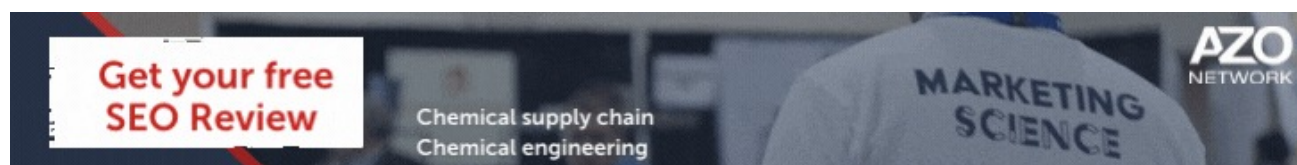
The reason most biobased materials use PU as a binding or coating agent is that most biomaterials inherently lack water resistance. This is a challenge for us as well. We're currently working on adapting the material and making it water-resistant as well, so that it can perform to the same standards as other leather materials without needing to rely on petrochemicals

Your company Uncommon Alchemy is currently developing this material into commercial products. What do you hope to achieve with this business?

We aim to provide the fashion industry with a leather alternative that meets the aesthetic and functional standards brands and customers will expect, without compromising on sustainability. The aim is to produce the material as a direct replacement, selling to brands who want to move away from petrochemical plastics and animal products. Our process will allow a high level of customizability so that brands can access exclusive textures and colours to meet their needs.

What are the next steps for your research and business?

We're currently investigating pilot-scale production so that we can begin producing larger quantities of the material for testing and partnership with early adopters while we work on overcoming the last few technical hurdles around water resistance. It's a really exciting time for us as we start to scale up so that we can bring this material to market!



Where can readers find more information?

Link to the Uncommon Alchemy website:

About Anna Watkins

Anna Watkins is the founder of Uncommon Alchemy, a company developing innovative, radically sustainable materials for the fashion industry. During her undergraduate degree in Fashion Brand Marketing at the University of Huddersfield, Anna became increasingly interested in sustainable materials and began developing her own biomaterial recipes. In 2020, she received a Young Innovators Award from Innovate UK and KTN to develop seaweed leather, and won the 20/21 Young Innovator of the Year Award from the Anjool Malde Trust. She is now undertaking an MSc in Product Innovation with Textiles whilst developing seaweed leather to commerciality.



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Skyla graduated from the University of Manchester with a BSocSc Hons in Social Anthropology. During her studies, Skyla worked as a research assistant, collaborating with a team of academics, and won a social engagement prize for her dissertation. With prior experience in writing and editing, Skyla joined the editorial team at AZoNetwork in the year after her graduation. Outside of work, Skyla's interests include snowboarding, in which she used to compete internationally, and spending time discovering the bars, restaurants and activities Manchester has to offer!