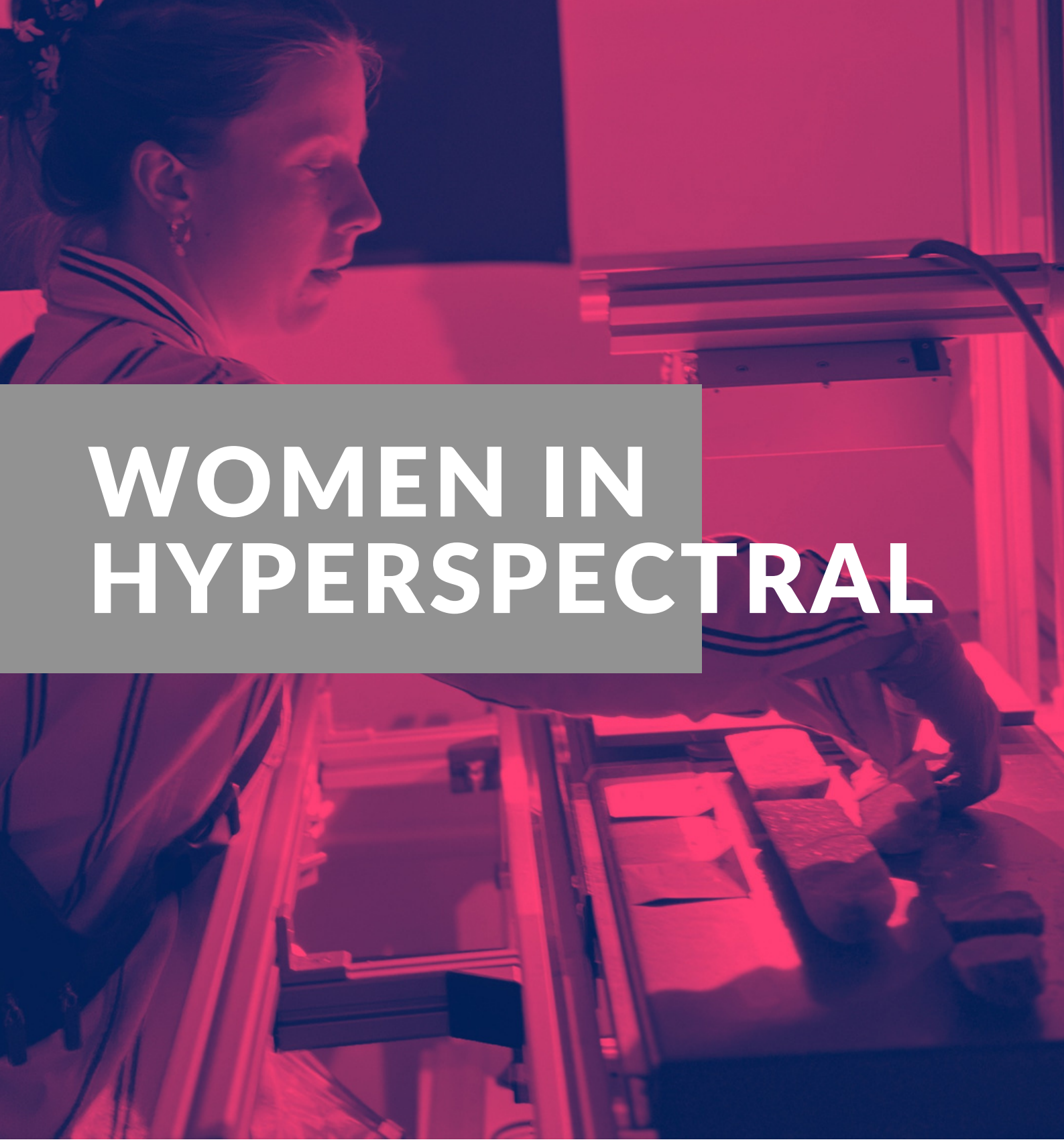
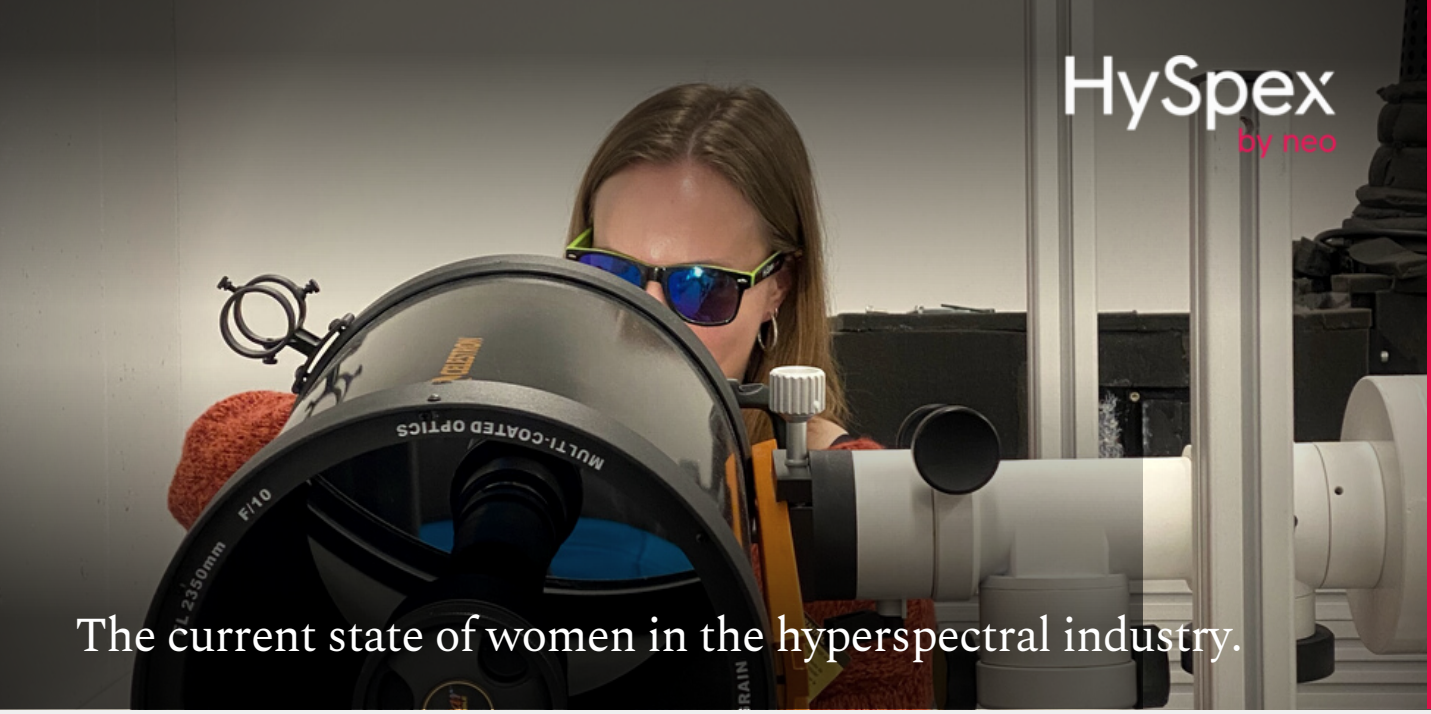


WOMEN IN HYPERSPECTRAL

2023 EDITION

HySpex by neo



The current state of women in the hyperspectral industry.

MARCH 2023
WWW.HYSPEX.COM

. INTRODUCTION

Hyperspectral imaging is a technology that allows for the collection and analysis of data across a range of wavelengths. This technology has a wide range of applications in fields such as agriculture, environmental monitoring, medical diagnostics.

As hyperspectral imaging becomes increasingly popular, it is important to examine the role of women in this field.

While women have made significant strides in STEM fields (including hyperspectral imaging) over the past few decades, they continue to face unique challenges and obstacles. These challenges include societal and cultural biases, lack of representation, discrimination in hiring, promotion, and pay.

Moreover, women from underrepresented groups, such as women of color, women with disabilities, and LGBTQ+ women, may face additional barriers due to intersectional discrimination.

Despite these challenges, women in STEM have made remarkable contributions to the field and continue to inspire the next generation of scientists and innovators. By supporting and empowering women in the industry, we can create a more diverse, equitable, and inclusive field that benefits everyone.

In this report, we will explore the current state of women in the photonics industry. By examining this, we can gain a better understanding of the challenges and opportunities.

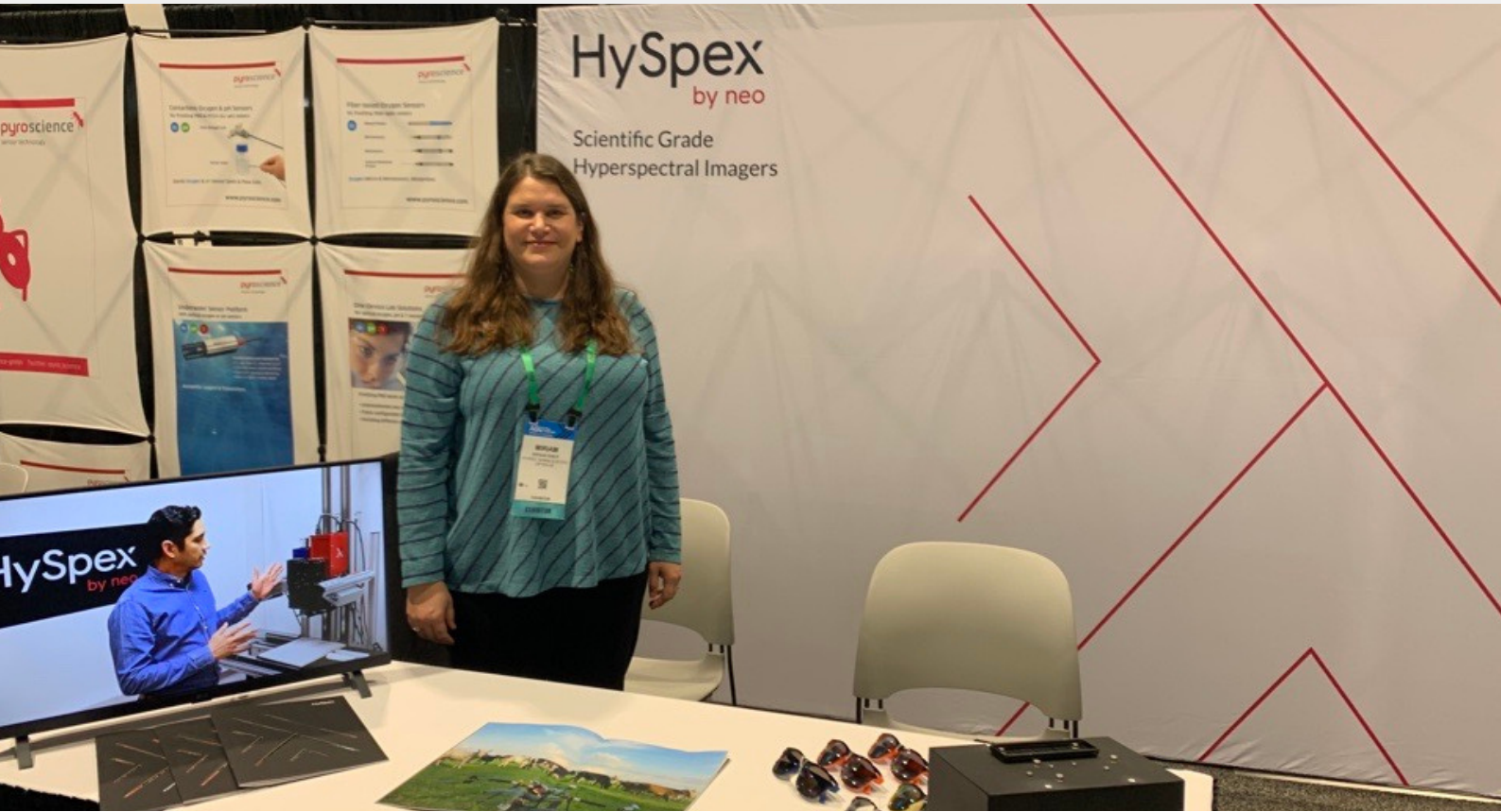
It's no secret that the hyperspectral industry has traditionally been dominated by men. However, in recent years, more and more women have been joining the field and making their mark as innovators and leaders. Women have been making great strides in the field of hyperspectral and photonics, from leading research projects and launching their own companies to mentoring the next generation of female scientists. Despite the challenges they face, these women are breaking barriers and paving the way for a more diverse and inclusive industry.

Women in the hyperspectral and photonics industry are using their skills to solve some of the world's most pressing problems, from advancing medical imaging technology to developing new methods for food safety inspection. Their contributions are invaluable and their impact is undeniable.

At Hyspex, we are proud to support and celebrate the women in the hyperspectral industry who are changing the game and redefining what is possible. To celebrate International Women's Day, we are launching a series of interviews with some of the amazing women at Hyspex who are making their mark in the hyperspectral industry. We will be showcasing their inspiring stories and the work they are doing to push the boundaries of what is possible.

We hope that by sharing these stories, we can inspire more women to pursue careers in the field and create a more diverse and inclusive industry.

We believe that a more diverse and inclusive industry is a stronger industry, and we are committed to creating an environment where everyone has an equal opportunity to succeed. Keep reading if you want to learn more.



. WOMEN IN THE HYPERSPECTRAL INDUSTRY

Hyperspectral imaging is a rapidly growing field, and although women are increasingly becoming involved, they remain underrepresented in the industry globally. According to a report by the International Labor Organization, women make up only 22% of workers in science, technology, engineering, and mathematics (STEM) fields worldwide.

There are several statistics that highlight the underrepresentation of women in the optics industry globally:

1. According to a study published by SPIE in 2021, women make up only 25% of the photonics workforce globally, including the optics and photonics industry.
2. A report published by the National Center for Women & Information Technology (NCWIT) in 2021 found that women hold only 23% of all jobs in the computing and mathematical sciences fields, which includes areas such as optics, imaging, and machine learning.
3. In a survey conducted by Women in Optics, a professional organization for women in the optics and photonics industry, 51% of respondents reported experiencing gender bias or discrimination in the workplace.
4. According to a survey conducted by the European Machine Vision Association in 2019, only 10% of the respondents working in the machine vision industry were women.

It is important to note that these statistics may vary depending on the region, specific industry subfield, and other factors. However, they illustrate the need for continued efforts to promote diversity and inclusion in the optics and hyperspectral industry.

Women make up

25%

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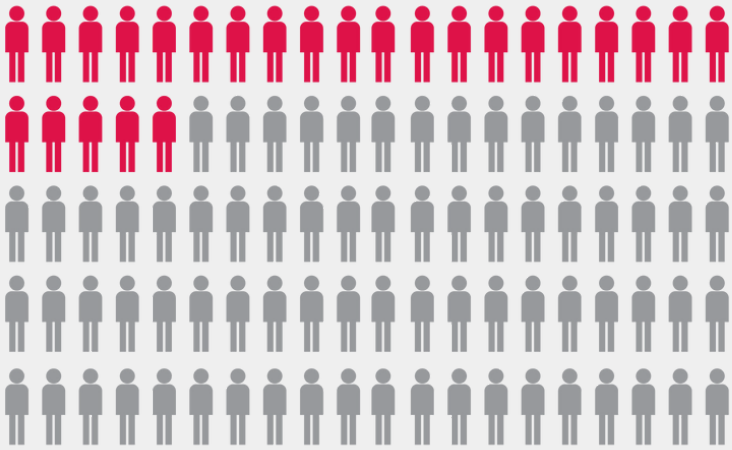

. CHALLENGES FACED BY WOMEN IN THE WORKPLACE

Despite progress, women continue to face unique challenges and obstacles in their professional lives. In particular, women in fields such as hyperspectral imaging, optics, and photonics may encounter a lack of representation, discrimination, and other barriers to success.

However, many companies are taking steps to address these challenges and promote diversity and inclusion in the workplace.

In addition to company-led initiatives, there are also broader efforts underway to address the challenges faced by women in the hyperspectral industry. For example, organizations like Women in Aerospace and Women in Science and Engineering (WISE) are working to support women in STEM fields and to promote diversity and inclusion in the industry. These organizations offer mentorship programs, networking opportunities, and other resources to help women advance in their careers.

Lack of representation

Women continue to be underrepresented in leadership positions in business. According to a study by McKinsey & Company, women hold only 18% of C-suite positions globally. This lack of representation can make it difficult for women to advance in their careers and can contribute to a lack of diversity in decision-making.

Discrimination and bias

They may face discrimination and bias in hiring, promotion, and pay. Moreover, women from underrepresented groups, such as women of color and LGBTQ+ women, may face additional barriers due to intersectional discrimination.

Work-life balance

Women in business may also struggle to balance their professional and personal lives. The pressure to succeed in a highly competitive field can make it difficult for women to take time off for caregiving responsibilities or pursue other interests.

Despite these efforts, however, there is still much work to be done to address the challenges faced by women in the hyperspectral industry. By promoting diversity and inclusion, providing mentorship and leadership opportunities, and addressing issues such as discrimination and work-life balance, the industry can create a more equitable and inclusive environment for all.

. SUCCESS STORIES OF WOMEN IN THE INDUSTRY

In the face of the challenges that women face, there are many successful women in the hyperspectral industry globally. For example, Dr. Katarina Svanberg, a Swedish physician, has made significant contributions to the field of hyperspectral imaging and has received numerous awards for her work. Dr. Hsiao-Chi Li, a Taiwanese scientist, has also made important contributions to the development of hyperspectral imaging technologies.

There are also organizations and networks that support women in the hyperspectral industry globally. For example, the Women in Science, Technology, Engineering, and Mathematics Network (WiSTEM) is a global organization that supports women in STEM fields, including hyperspectral imaging. The International Society for Optics and Photonics (SPIE) also has a Women in Optics program that supports women in the optics and photonics industries.

Here are some initiatives by SPIE that aim to support women in the hyperspectral industry:

1. Women in Optics: SPIE's Women in Optics program aims to support women in the optics and photonics fields through a variety of initiatives, including networking events, mentorship programs, and leadership workshops. The program also highlights the achievements of women in the field and works to raise awareness of issues related to gender equity and inclusion.
2. Diversity and Inclusion Task Force: SPIE has established a task force focused on promoting diversity and inclusion in the optics and photonics fields. The task force works to identify and address barriers to diversity and inclusion, and to develop initiatives and resources to support underrepresented groups in the industry.
3. Scholarships and Awards: SPIE offers a range of scholarships and awards to support students and early-career professionals in the optics and photonics fields. Several of these awards are specifically targeted at women, including the SPIE Women in Optics Planning Grant, which provides funding for initiatives to promote gender equity and inclusion in the field.

By supporting these initiatives, SPIE is working to promote diversity and inclusion in the hyperspectral industry and to create a more equitable and supportive environment for all professionals in the field, including women.

In conclusion, although women are underrepresented in the hyperspectral industry globally, there are many successful women who have made significant contributions to the field. However, more needs to be done to support and promote the participation of women in the industry globally, including creating more opportunities for mentorship and leadership, improving work-life balance, and addressing discrimination and bias.

. THE WOMEN OF HYSPEX

Here at Hyspex, we have many women making great contributions to the industry and we hope their stories will inspire others. We interviewed some of them to gain some insights and perspective.

Janette Wilson
Sales Manager

Miriam Riner
Sales Manager

Friderike Körting
Application Specialist

Karina Strøm
Research scientist

Karina Strøm, Research Scientist

Karina Strøm is a research scientist in the hyperspectral industry and has been working with hyperspectral cameras for several years now. She has been working in NEO/Hyspex since 2019.

When asked how she first became involved in the industry, she revealed that she found the courses related to light and waves the most interesting while studying. She chose photonics as her master's degree, and her interest in the subject led her to Hyspex, where she found her passion for working with hyperspectral cameras. She was hesitant because she did not know about many businesses that work within photonics in Norway, but she knew about NEO/Hyspex and decided to go for it. Luckily, she said she was able to get a job here. At first, she started working with other things but quickly got into working with our hyperspectral cameras which is our main product.

What has been the most surprising thing you've learned while working in the industry? How do you see the role of women in the industry evolving in the coming years?
The fact that there are that few women in the industry. I did expect it somewhat based on the number of women who I studied with, but I have still encountered less than expected. I think that we will see more women in general in the industry in the coming years, and as there will be more talented women I think we will see an increase in female leaders in the industry.

What do you think are the most important skills to have in order to be successful in the industry?
Motivation and passion. If you are passionate about your work and the industry it will be more rewarding and fun. You also need to be motivated to get the work done as there may be many challenges and hard work.

When prompted about what advice she would give to someone just starting in the industry, Karina said that if you enjoy what you are doing the work will always be rewarding and fun. You will learn a lot working hands-on with the technology and gain a lot of experience within an interesting industry. Keep going.

Friederike Körting, Application Specialist.

Friederike Körting is an application specialist within our firm, focusing on geology. She has been in the company for 2 years.

During the interview, Friederike Körting shared that she started her journey in the hyperspectral/photonics industry as an intern at the German Research Center for Geosciences in the remote sensing department. She went on to complete her bachelor's, master's, and doctoral thesis connected to the University of Potsdam. Körting also found connecting with people to be the most rewarding experience in her career, especially within a smaller research community. She has met many selfless people in the industry who have helped her and others and is now happy to mentor the next generation of students.

What advice do you have for other women looking to pursue a career in hyperspectral/photonics?
Be as loud or quiet, as introverted or extroverted, as gentle or brisk as you are, and need to be to stay true to yourself. Don't try to fit into an industry primarily made up of men. As soon as we as female-presenting human beings try to adapt, code-switch, or blend in, we're losing the ability to contribute to this sector and to make it better. I'm still hoping that we'll all realize sooner rather than later that diversity is a strength, not only for the community but for the industry. And until everyone does realize it we'll stress that point. Also, apply to that job, even if you don't tick all the boxes. In interviews, ask for a non-cis-het person to join and talk about their experience working for the company. Chances are that the men in the room will not be aware of potential roadblocks for you or the environment they've created in the office or company and you want to make sure that it's not a hostile environment for you.

As a woman in the industry, Friderike faced challenges such as being the only woman in the room, being young, and being constantly talked over or expected to play the secretary. She hopes that the industry will become more inclusive and diverse, with women playing a significant role in opening doors for each other while challenging their own biases. Körting sees the future of the hyperspectral/photonics industry developing into a field of true industry implementation, particularly in mining, and hopes that mining will trust in the potential of hyperspectral imaging. We're tiptoeing around this point and still, only a couple of service providers are getting to a point of using HSI as a standard in mining.

How do you see the role of women in the industry evolving in the coming years?
I hope we'll continue to open doors for each other while challenging our own biases. I've met a lot of strong, intelligent, enthusiastic, and inspiring women over the years - I hope we can pay this enthusiasm forward and build an inclusive, creative, adaptive industry. I think women will play a huge role in this. I don't want to get excited about seeing another woman or female-presenting person in a meeting, I want it to be so day-to-day that I don't notice it anymore.

What has been the most surprising thing you've learned while working in the industry?
Not all of it is rocket science, you don't need a Ph.D. to understand the field and it is, in fact, accessible to everyone interested. Don't let the smarties turn you away, your contribution might as well help shape the field.

What new technologies and innovations are you most excited about in the hyperspectral/photonics industry?
We're just starting a project called m4mining, that will be looking into the development of hyperspectral UAV systems. Aside from the hardware development, I'm quite certain that we have the right consortium and background represented in our partners to find an autonomous real-time approach using hyperspectral drone-based measurements to guide both active mining as well as the monitoring of mining landscapes. I'm super excited to be a part of that project and the consortium and to have an active exchange with miners and stakeholders.

What do you think are the most important skills to have in order to be successful in the industry?
Grit and enthusiasm. My doctoral thesis showed that to me and my start-up company as well. It takes time, you'll be frustrated and it is grudgingly slow at times. It takes a while to make miners believe in the technology and put their money where their mouths are. I still believe it's worth the try.

A piece of general advice from Friederike: Have a look at the science and application happening around it, if you're coming from an industry application or a specific question that needs to be answered, reach out to us and we can help you figure it out. If you're studying in the field find join a conference and meet people. The hyperspectral community is more inviting than you'd think

Miriam Riner, Sales Manager

Miriam has recently joined NEO/Hyspex as a Sales Manager. She has a background in geological sciences and spectroscopy.

How did you first become involved in the hyperspectral/photonics industry?
I had an interest in outer space from early childhood. I studied electrical engineering at university but didn't enjoy my first job. So, I went back to graduate school in planetary geology, hoping to bridge the gap between scientists and engineers designing spacecraft missions to other planets. Since we rarely have access to the surface of other planets, we study them using remote sensing. I quickly selected a specialty in spectroscopy because I was attracted to the quantitative nature of the analysis and the types of scientific questions that can be answered with multi- or hyperspectral images. Now I use the same techniques to solve very different problems. But once you know how to use the tool you can collaborate with other experts to solve varied and exciting problems.

Miriam shared that the most rewarding experience in her career so far was the growth and independence she developed during the process of earning her Ph.D. Over the course of years working with many mentors she molded her mind to think differently, deeper, and more critically. A key requirement of the Ph.D. is to make an original and significant contribution to accumulated knowledge. That's no small task. First, you must learn an enormous amount, just to know what has already been done.

To find a unique contribution you must think critically, see unique links between different ideas, process all that information, and come to your own conclusions. Throughout the process, you will be challenged to defend your ideas to your colleagues. By the time you are ready to defend your dissertation, you know more about the topic than anyone in the world, but you must be able to explain it well to people with different levels of expertise. It's a transformational process that was also rewarding for her.

What advice do you have for other women looking to pursue a career in hyperspectral/photonics?
Network. Networking can be intimidating particularly when you are first starting. But it's like a muscle, the more you do it the easier it will become. Don't just network when you are looking for a job. While networking can open doors to new job opportunities it also allows you to form connections with people professionally. Once you establish a habit of networking it will provide human connection and professional confidence. Sharing ideas helps you work through problems and possibly see new solutions. Also, approach networking with a desire to give as well as receive. It may seem like you don't have a lot to give when you first start out but always be looking for ways. Finally, don't be afraid of rejection. Expect it and move on.

What have been some of the challenges you've faced in your career?
Leaving academia was the biggest challenge of my career. After so many years of dedicated work, it was part of my identity. And it was fun work! But I knew it didn't allow the lifestyle and geographical freedom I wanted. After ten years of working in-depth on very specific questions, I wanted more breadth. Now I apply the same technique, hyperspectral imaging, to very different problems. One day I might be talking to an engineer about sorting plastics and the next day to a professor about environmental science. It takes courage to end something so you can begin something new.

When asked about the most important skills to have in order to be successful in the industry, Riner shared: "First and foremost, one needs a strong technical foundation. Study science or engineering and make it your mission to always be learning. Creativity is also an important skill. Science and engineering are all about problem-solving. Being able to see problems in creative ways allows you to devise unique solutions. Finally, you must be persistent. Problem-solving involves a lot of failures. Being able to learn from them and bounce back is crucial to professional success, not to mention mental well-being."

As for advice to someone just starting in the industry, she said that it's crucial to find good mentors. Don't pick a job or a graduate school only for the prestige or the salary (though those can be factors). Carefully consider your advisor or supervisor and pick someone who can help you develop professionally.

Janette Wilson, US Sales Manager

Janette has been working for NEO/Hyspex as the US Sales Manager for more than 4 years. She has a lot of experience in the hyperspectral industry and she has a background in geology and spectroscopy.

She has always been fascinated by space exploration since she was little and she always wanted to be an astronaut. As Janette grew, she realized that it wasn't the actual act of going to space she cared about, as much as exploring the unknown through science. As an undergraduate geology student, she had the opportunity to do some geochemical work tangential to the Martian blueberries supporting the theory that they formed in the presence of water. She also had the opportunity to work in a lab run by a professor doing spectroscopy work to create reference libraries for data coming back from the DIVINER mission studying the moon. Both of those undergraduate experiences attracted me to spectroscopy as a way to connect my interests with the scientific questions of the time. I then attended graduate school in the field of geologic remote sensing where I worked as a part of NASA's CRISM team using orbital hyperspectral data to study the Martian surface.

What has been the most rewarding experience in your career thus far?
It is incredibly rewarding to know the work I do now allows people from all over the world to use hyperspectral imaging to study and solve the most important problems facing our society. It is applicable to so many fields of study, but personally, what stands out is the sheer number of priceless artifacts and works I have been able to study with hyperspectral imaging. These are things most people will never get to see in their lifetime like the Dead Sea Scrolls or the Gettysburg Address or even an ancient Mayan vase. I feel incredibly privileged to have been able to work on so many projects, including the work that led to the repatriation of Schiener's Oculus to the Swedish Library, which was one of a number of works that had been stolen.

What advice do you have for other women looking to pursue a career in hyperspectral/photonics?
Photonics is the way of the present and future. Hyperspectral imaging is a broad and burgeoning field that has so many opportunities for growth in whatever discipline you choose. My advice would be to find the field that resonates with you and choose carefully the people you allow to guide you based on a true personal connection. To do this, seek opportunities that will grow your network and your experience, but not at the expense of your best interest. Share your experiences and seek out the experiences of others – this allows us all to learn, grow, and further the betterment of the workplace for women.

Janette Wilson thinks the most important skill to have and develop is flexibility. In photonics, and any other field rapidly growing and changing, a good foundation and ability to adapt will go a long way.

How have you leveraged your success as a woman in leadership roles?
I started my industry career in a sales and applications role. Despite facing the typical headwinds many women face in the workplace, I set goals and worked toward them regardless. For example, I developed a time frame to learn certain skills before moving on to new opportunities. I always employ a mindset of doing things I see need to be done without having to be asked to do them. Not only does this show initiative, but it is an excellent way to learn and choose the opportunities you know will help you gain the knowledge you'll need to fulfill your goals. This way, I still gained experience and with proven success, I was able to move up the ladder as my career progressed.

Janette suggests that for someone who is just starting out in the hyperspectral/photonics industry, it would be beneficial to make connections, ask questions, and share experiences. She advises that it is important to follow one's true interests and build skillsets accordingly, and assures that the rest will come with intention.

It was a pleasure to hear from the ladies at NEO/Hyspex, all of them prominent figures in the hyperspectral/photonics industry. Their insights into the challenges faced by women in the industry and the importance of diversity and inclusivity are inspiring. Their advice to those starting out in the field, to follow their interests and build their skillsets accordingly, is valuable and highlights the importance of personal passion and intention. We thank all of them for taking the time to share their experiences and perspectives with us, and we look forward to seeing their continued contributions to the industry.

It is our hope that the stories and experiences shared by these women in the hyperspectral/photonics industry will serve as inspiration for other young women who are interested in pursuing similar careers. While there is still much work to be done to increase gender diversity in these fields, it is important to highlight the successes of women who have already made significant contributions. By hearing about the challenges they faced and the strategies they used to overcome them, we hope that more young women will feel encouraged to pursue their interests in science and engineering. Through mentorship, networking, and a commitment to building diverse and inclusive workplaces, we can create a more equitable future for all.

. BENEFITS OF DIVERSITY AND INCLUSION

Promoting diversity and inclusion in the hyperspectral industry can bring a range of benefits to companies, professionals, and the industry as a whole

- Enhanced innovation and problem-solving: Studies have shown that diverse teams are better able to innovate and problem-solve than homogenous teams. By bringing together individuals with a range of backgrounds, experiences, and perspectives, companies in the hyperspectral industry can generate new ideas and approaches that drive innovation and growth.

- Improved business performance: Companies that prioritize diversity and inclusion often outperform their peers in areas such as financial performance, productivity, and employee satisfaction. By creating an environment where all employees feel valued and supported, companies can improve retention rates and attract top talent.

- Better decision-making: Diverse teams are better equipped to make informed decisions, as they are able to draw on a range of perspectives and insights. This can lead to better outcomes and more effective decision-making processes.

- Increased social responsibility: Companies that prioritize diversity and inclusion are seen as more socially responsible and can better connect with customers and stakeholders who value diversity and inclusion.

By promoting diversity and inclusion, companies like Hyspex are not only supporting women in the industry but also unlocking these benefits for their businesses and the industry as a whole. In order to fully realize these benefits, however, it is essential for companies to take a holistic approach to diversity and inclusion, addressing issues such as unconscious bias, systemic barriers, and cultural norms that can limit the full participation of underrepresented groups in the industry.

By prioritizing diversity and inclusion in the hyperspectral industry, we can create a more vibrant, innovative, and sustainable industry that is better equipped to tackle future challenges.

In conclusion, promoting diversity and inclusion in the hyperspectral industry is not only a matter of social justice and equity, but also a key driver of innovation, business performance, and social responsibility. By prioritizing diversity and inclusion, companies like Hyspex and organizations like SPIE are not only supporting women in the industry but also unlocking the full potential of their businesses and the industry as a whole.

To fully realize the benefits of diversity and inclusion, companies and organizations need to take a holistic approach, addressing not only individual biases and barriers, but also systemic issues such as lack of representation, cultural norms, and institutional policies that can limit the full participation of underrepresented groups in the industry.

By working together to promote diversity and inclusion in the hyperspectral industry, we can create a more vibrant, innovative, and sustainable industry that is better equipped to tackle the challenges of the future.

HySpex
by neo