For a better sinusitis diagnosis

MÄRTA – AN APPLIED ACADEMIC

and a recipe for a successful career

What makes a PhD student attractive to future industrial employers? For Märta Lewander, it clearly was her solid academic background and practical knowledge on how to apply it in a user situation. Märta is one of the sought-after PhD students of PIEp, who soon will be leaving the programme but will continue to work in its spirit.

“They are only 1 mW lasers,” explains Märta Lewander. “That’s just a portion of the optical power of commercial laser pointers, but it’s perfectly all right for beaming through human tissue.”

We are inside one of the labs at Atomic Physics, a division at the Faculty of Engineering, Lund University. PhD Student Märta Lewander has taken a break from writing her thesis to demonstrate the laser equipment she uses for analysing gases in the cavities – sinuses – of the human skull. Together with her supervisor, Professor Sune Svanberg, and co-workers, Märta has developed a simple and robust tool for the diagnosis of sinusitis. Today, sinusitis and related sinus problems are hard to diagnose. The methods used include clinical examination, endoscopy and X-ray analysis, all labour-intensive. X-ray analysis is quite an expensive alternative, involving ionising radiation. The tool Märta developed has a non-invasive approach, is based on a lenient, low-power laser and is very cost-effective. That is why it would be a most welcomed supplement to existing methods.

“With this equipment you can get an immediate diagnosis – are the sinuses filled or are they blocked? That would save both time for the patient and money for healthcare, and would also substantially reduce the use of antibiotics as well as the use of ionising radiation,” Märta explains.

Märta Lewander is 29 with an MSc in Engineering Physics and is currently a PhD student in Atomic Physics. In December she will defend her thesis on the GASMAS Project (GAS in Scattering Media Absorption Spectroscopy) and its applications in medicine and food. Already as a master student,
Märta was involved in the project, and after a year of further pedagogical training, she returned to Lund University for PhD studies.

“I was contacted and applied for the PhD student position. I definitely wanted to go back to Lund University and the Faculty of Engineering, so I applied and got it. That was in the autumn of 2006.”

It was in the second year of her PhD studies that Märta came in touch with PIEp. She met Associate Professor Annika Olsson, node leader for PIEp at Lund University, and started collaborating on applications of the GASMAS technique on food packages. Annika suggested that Märta attend a med-tech conference in the USA, and at the same time take part in a workshop for PhD students in PIEp. Märta went there, enjoyed the arrangement, and connected with the other students. Since then she has been part of the PIEp doctoral students’ network.

“For me the network with other PhD students and researchers is definitely the most positive effect of being part of PIEp,” Märta relates, “Suddenly you realise there are other people with the same approach to research and who are dealing with the same kind of problems. Of course, the economical benefits are also important. Thanks to the financial support from the programme I can finish my studies and transfer knowledge to Patrik Lundin, my fellow PhD student, who will continue this research track.”

The heart of the GASMAS technology: the laser.

After completing her PhD, Märta will start a new job at a research institute in Stockholm. She will continue working with laser technology, but with other applications.

“There were many applicants. I believe I got the position much because of my solid academic background, combined with practical knowledge on user-oriented applications of the research. I think that is something that fits well into the vision of PIEp,” Märta concludes.

FACTS – GASMAS FOR SINUSITIS DIAGNOSIS

In this application, GASMAS uses laser spectroscopy for detection and analysis of oxygen and water vapour in human sinuses. These gases can be measured since they have absorption lines within the tissue transmission window (wavelengths between 600-1400 nm) given by the absorption of the water and blood in the tissue. The oxygen content reveals the degree of ventilation in the sinuses (if they are open, partly or totally blocked), and the water content corresponds to the sinus volume. The GASMAS technique cannot be used to detect bacterial or virus infections; that must be determined by standard cultivation techniques.

The GASMAS technique is patented and currently being developed by the spin-off company GasPorOx AB. The next steps include making a smaller and more portable prototype and verifying the technique. This is being done in collaboration with doctors at the Skåne University Hospital, who will devote part of their time to research on this subject.