Final report

Internship abroad

Personal data and general information on the internship

Subject of studies: Physics (Thesis)

Bachelor/Master/State exam: Master

Place of internship: Poznan, Poland

Internship institution: Adam Mickiewicz University

Planning and Preparation:

I arrived in Poznan during the month of March. Having previously participated in an Erasmus exchange during the last semester, I was genuinely enthusiastic about this new experience. My decision to undertake my Master's thesis in Poland stemmed from the fact that the research topic and ongoing work here closely aligned with my academic background and future aspirations.

Beyond the academic scope, during my earlier Erasmus exchanges, I had the chance to explore much of Central and Western Europe, their countries and cultures. However, I had limited exposure to Eastern European traditions and lifestyle. Thus, I felt this opportunity would be a valuable addition, allowing me to study a subject of personal interest while immersing myself in a different cultural context.

I was fortunate to be assigned a room in the university dormitory named Meteor, conveniently located near the department where I worked (i.e. the Physics Department). Most essential services such as banks, public transport, healthcare facilities, and grocery stores were within walking distance of the dorm. Just a few steps away were supermarkets like Kaufland and Lidl. What stood out the most, however, was Poland's particularly Poznan's, extensive network of convenience stores known as "Zabka." These stores remain open throughout the week and stock almost all necessities, which is particularly helpful for students.

Speaking of my overall experience in Poznan as an international student, I would say it doesn't feel like a drastic transition if you've already had exposure to multicultural environments. Even if you haven't, staying in a student dormitory ensures you're surrounded by people from various nationalities and cultural backgrounds, most of whom can communicate effectively in English. Generally, the younger Polish population has a

decent command of English, although it might be more challenging to communicate with the older generation. Still, learning a few basic Polish greetings can go a long way, they genuinely appreciate it when foreigners make an effort to speak their language.

In terms of cost of living, compared to Munich, the difference is quite significant. Accommodation in a single room within a student dormitory typically ranges between 200 to 240 EUR per month. Aside from that, daily expenses and essential services such as transportation and mobile plans usually amount to about 300 to 350 EUR, assuming a modest lifestyle. Naturally, if one is more socially active, the expenses might be slightly higher.

Although I received some financial support from the research group under which I was conducting my thesis, it wasn't sufficient to cover all expenses. Hence, the Erasmus+ scholarship played a vital role, providing the financial stability I needed to focus on my research without any financial constratints.

Internship (Task/Workload):

Throughout the duration of my thesis, I maintained a consistent routine of approximately six hours per day, varying slightly depending on the phase of the project. My day typically began with heading to the laboratory around 10 a.m. and returning around 5 p.m. This schedule included time for lunch and, quite often, coffee breaks.

In the early stages of the thesis, I was assigned to review material provided by my advisor and simultaneously prepare written reports based on it, which I had to submit regularly. In hindsight, I found this to be an excellent approach, as it gave me a solid foundation of content that later served as material for my thesis, significantly reducing the effort and time required during the drafting phase.

The experimental work began with fabricating an Au-Si based nanomembrane, where we aimed to modify the gold (Au) surface by introducing an artificial periodic lattice pattern of nanoholes using the Focused Ion Beam (FIB) sputtering technique. This process transformed the nanomembrane into an acoustoplasmonic metasurface.

To verify the success of our fabrication, we employed various analytical methods, including Atomic Force Microscopy (AFM), Scanning Electron Microscopy (SEM), and FIB imaging. Once we confirmed that the desired morphology had been achieved, we

proceeded to the optical characterization stage. Here, we conducted Brillouin Light Scattering (BLS), a technique primarily used to detect acoustic vibrational modes in solids, or more simply, high-frequency sound waves.

The data from this technique enabled us to calculate several mechanical and elastic parameters, such as the stiffness tensor, Young's modulus, and Poisson's ratio. The experimental work was partly carried out in collaboration with the NanoBioMedical Centre at AMU.

During this period, I also had the opportunity to present my research at a few internal and external conferences, which proved to be an enriching experience. The overall approach of the research group toward workload was well-balanced. Most of the time, my responsibilities were moderate, but during more intense periods, like preparing for conferences or drafting the thesis, the group's motivation and support inspired me to invest additional effort. This was made possible thanks to the consistent academic and administrative guidance provided by both my advisor and the team.

Social Contacts:

The extent to which one develops a vibrant social life in Poznań largely depends on individual initiative. Initially, my interactions were limited as I primarily focused on lab visits and returned to my accommodation afterward, without engaging much with the local or international community. However, a turning point came when I spontaneously joined a trip organized by the Erasmus Student Network (ESN) to Krakow, which I discovered through their social media post on Facebook. This experience significantly transformed my social life for the remainder of my stay.

During the trip, I met incredible people, many of whom were also living in the same dormitory. As we got to know each other, we began organizing various social gatherings and events together. In addition to such spontaneous experiences, the ESN and the Erasmus coordinators in Poznań regularly host on-campus events specifically for Erasmus students. Through these events, I had the opportunity to meet many local students, who later shared helpful recommendations for places to visit and local restaurants to try.

In conclusion, for any Erasmus student looking to build social connections in Poznań, I highly recommend actively following ESN updates and participating in their events. It's a great way to meet new people and enrich your overall experience.

Everyday Life and Leisure:

I've already touched on a slice of my everyday life earlier, but to add a bit more briefly speaking, I managed to keep a healthy balance between work and leisure throughout my stay. Thanks to well-planned task management and a structured thesis schedule, I had ample time to experience life outside academics in Poznań. The city offers a vibrant mix of experiences from cultural restaurants and public amusement parks to the zoo and charming vintage bars. These moments away from work added a refreshing dimension to my Erasmus journey.

Financing

Breaking down my expenses into rent, daily living costs, and initial/miscellaneous costs—my accommodation rent was 980 PLN, roughly 230 EUR, and I can confidently say the dormitory (Meteor) was worth every cent. Daily living expenses accounted for about half of my total spending, around 230–250 EUR. Adding the miscellaneous costs and initial setup, my overall monthly expenses came to approximately 550 EUR.

Internship and Studies:

The internship was a truly enriching experience, sparking my interest in studying solids through non-invasive techniques such as Brillouin Light Scattering (BLS). The complete process spanning simulations, fabrication, and characterization made me realize the broad applicability of this research. I had the opportunity to work on a full sample-processing workflow, from conceptualizing and designing through simulations, to fabricating with Focused Ion Beam (FIB), and finally characterizing with methods like BLS and electron microscopy (FIB/SEM). This gave me an end-to-end, "full-stack" perspective on processing metamaterials.

This hands-on exposure has inspired me to consider pursuing a PhD in a related field, especially as the principles of Surface Acoustic Wave (SAW) devices can be adapted to create customized sensors an area that fascinates me. I was also incredibly fortunate to be part of such a supportive research group, whose encouragement and motivation made the journey even more rewarding. While I currently lean toward a career in industry, I was genuinely impressed by the academic work culture, with its flexibility and intellectual freedom. This has also planted the idea of possibly returning to academia in the future.

Conclusion:

To sum up, I can say without hesitation that my expectations for this master's thesis were fully met perhaps even exceeded. Academically, the most valuable skill I honed was maintaining a schedule and completing tasks ahead of deadlines. One notable challenge was navigating administrative procedures, which, being different from the German system, took a little trial and error to get right. After a few attempts, I eventually figured out the correct sequence of steps.

A defining highlight of my time in Poznań was the cultural immersion. From casual conversations with locals and fellow dorm residents to Erasmus Student Network trips across Poland, every interaction added richness to my experience. If I were to give one piece of advice to anyone considering coming to Poznań, it would be this: fully engage in both the academic and cultural aspects of your stay. In my experience, each one enhances the other, making the journey truly unforgettable.