

**Report of the exchange student
from Saint-Petersburg State Polytechnic University
at Leibniz Universität Hannover
15.10. – 15.11.2014**

I was in Germany for one month, taking part in the LUH - SPbSPU DAAD Strategic Partnership program. I'm studying in Saint Petersburg Politechnical University in Russia and my general area of interests is Quantum electronics. My University suggested me to go on probation to LZH. I agreed, that's how my journey started.

I do not know German language at all, but it didn't become a problem. At LZH all workers speaks English very well, also there were many Russian people too. At my first day I was met in the airport and shown all what I need in the city. It was very nice, because usually in unknown countries I feel uncomfortable at first. Nevertheless, Germany made a very good impression on me, and the Hannover city is so nice and peaceful, that I immediately felt home from home.

The thing I haven't expected is there are no chances to find an apartment for only one month staying. The only variant is to live in hotels, hostels or guest houses. But the guest house, I lived in was clean, quiet, with friendly neighbors and householders.

After discussions with LZH co-workers I get a number of interesting research ideas for my master graduation thesis. All colleagues were very pleasant and helped me with making experiments. As a result, at the end of probation I get a number of good measurements.

Subject of my graduation thesis is protein research in liquids, but at my home university there in no possibilities to make real lab experiments. So at LZH I used a special device: Laser Correlation Spectrometer (LCS), that measures particles sizes in solutions. At first, to understand how it works, I made a number of measurements with silica nanoparticles with already known sizes. All material was in my free access.

The second step was to research polydisperse particles in liquids. The material was gold nanoparticles in water, which were made by laser ablation of gold plate. All probes I made by myself with help of LZH co-workers. With LCS I measure the particles sizes. To check this result, I used an electron microscope, it usually gives more precise results, but it suits only for dry samples, that's why it can't be used for proteins. Comparing LCS and electron microscope results, I chose the best concentration, power and other parameters for next research.

After all I get some protein solutions. The main idea of research was to understand how proteins in blood work in different conditions. So I made several types of albumin (main blood protein) solutions with different pH level. Determining protein sizes I found a mean acidity at which the aggregation reaction is starting. This type of reaction is very bad for human organism, and usually is caused by different heavy metal salts, that get in blood with food, water or air. These measurements allow me to determine a heavy metal concentration that will be dangerous for health.

Except heavy metals, different internal factors can make negative influence on protein reactions. For example, immune diseases causes anomaly globulin (protein, which is a part of immune system) reactions. In this case, protein research can help to determine disease on the initial stage. With help of LCS, I started to make measurements on bull serum, which contains blood liquid, all proteins and other blood components, except cells. I got a size distribution picture in normal conditions and then with different acidity. Proteins in serum react on pH in a same way as albumin molecules in water solution: at some mean pH level process of protein aggregation is observed, which is detected as increase of particles size.

To research proteins reaction I measured their sizes in serum with some enthetic cells involved. In this case I can detect a normal, healthy reaction of immune proteins. Comparing it with reactions of blood proteins, which were gotten from diseased organism, I can make a table of typical reactions depending on a kind of illness. In future it will help to make medical research for finding abnormalities in immune system at initial stages.

These results will help me in writing of my master graduation thesis. Also all the journey was a very good experience for me. Work in the lab helped me to understand how the real scientific work is done, and as the result I came to decision to continue my education after muster graduation.