

My stay abroad – Selina Eng

During my six-month research stay at the MERLN Institute in the Netherlands, I had the chance to work on my Master's thesis, focusing on the development of an injectable, self-healing hydrogel with potential applications in regenerative medicine. The aim of the project was to design a hydrogel system based on 8-arm PEG, intended for minimally invasive therapeutic delivery while supporting the body's natural ability to repair bone tissue.

As part of the work, I synthesized and functionalized mesoporous silica nanoparticles (MSNs), which were then embedded into the hydrogel matrix to create nanocomposite systems. These nanoparticles were designed to enhance the hydrogel's mechanical properties. To better understand and evaluate the materials I worked with, I applied a range of analytical techniques, including dynamic light scattering (DLS), zeta potential measurements, transmission electron microscopy (TEM), Fourier-transform infrared spectroscopy (FTIR), and nuclear magnetic resonance spectroscopy (NMR).

One of the most important aspects of the project was optimizing the hydrogel's pH-responsive crosslinking mechanism, which allowed us to control gelation and achieve reliable self-healing behavior. The final systems were tested for injectability, in vitro stability, and mechanical performance. Rheological analysis provided especially interesting insights into the gels' behavior under stress, which I explored in detail in my thesis.

This work contributes to the broader field of biomaterials by presenting a hydrogel platform that brings together responsiveness, injectability, and better mechanical properties, which are qualities that are increasingly important in tissue engineering and regenerative therapies.

The MERLN Institute offered a very helpful and kind scientific community in which I could learn a lot about the field of regenerative medicine. The city of Maastricht is a small city in the province of Limburg, but has a lot of charm. With its blend of historical architecture, riverside scenery, and a lively international atmosphere, it offered a very pleasant balance to the intensity of lab work.

Overall, the stay at the MERLN Institute allowed me to carry out meaningful scientific work in a highly collaborative and innovative environment and being able to cooperate with delightful people. I am very happy that I had this opportunity.

