

MWP – Young Researcher Abstract 2025

Project title: Wood-based electrodes and electrode-skin interfaces for bioelectronic wound dressings	
Author: Matilda Öjmertz, José Leal, Lukas Matter, Maria Asplund	
Affiliation: Chalmers University of Technology, Department of Microtechnology and Nanoscience	E-mail: ojmertz@chalmers.se
<p>Abstract (approx. 200 words): Chronic wounds, such as diabetic ulcers and post-surgical wounds, represent a significant challenge for the healthcare system as they cause prolonged patient suffering and high demand on medical resources. My research targets this issue by developing a sustainable, wood-based system for electric wound healing, which has been shown to increase healing rates by up to three times using direct current (DC) stimulation.</p> <p>At the core of my project is the use of cellulose and lignin as substrates for laser-induced graphene (LIG) electrodes. This approach offers a sustainable, cost-effective, and scalable method for fabrication of biocompatible electrodes and sensors, circumventing the need for scarce and non-renewable metals. The abundance, biodegradability, and mechanical properties of cellulose and lignin make them promising materials for medical applications, particularly in wound care. To address the key challenge of developing wood-based materials that exhibit efficient conductivity and stimulation properties, I will also explore methods inspired by textile fabrication and additive manufacturing. I plan to validate prototypes using 3D skin models to ensure clinical relevance and work closely with a startup aiming to commercialize this concept, ensuring alignment with market needs and real societal value.</p> <p>By utilizing wood-based substrates for fabrication of biomedical components, this research opens new markets for forest-based industry beyond traditional use and promotes green technologies in healthcare.</p>	
Key words: Organic electronics, Bioelectronics, Hard-to-heal wounds, Cellulose, Lignin, Laser-induced graphene	