Exciting Master's Project Opportunity: Revolutionizing Green Hydrogen Production with Advanced Coatings for PEM Water Electrolyzers

Are you passionate about sustainable energy solutions? Join a cutting-edge project focused on Proton Exchange Membrane Water Electrolyzers (PEMWE), a key technology for producing green hydrogen at high efficiency. In this project, you will explore innovative approaches to improve the performance of the porous transport layer (PTL), a critical component responsible for oxygen removal from water in PEMWE systems.

Challenges to Tackle: While titanium PTLs are widely used, they suffer from passivation in highly oxidizing and acidic environments, causing a significant rise in overpotential. Current solutions involve costly precious metal coatings, such as platinum, applied with physical vapor deposition. However, these coatings are often claimed to be too thick (~um), and poorly adhered, which lead to performance issues, including corrosion and increased electrical resistance. Refer Figure 1 showing poor quality of commercial platinum coatings on Ti PTL.

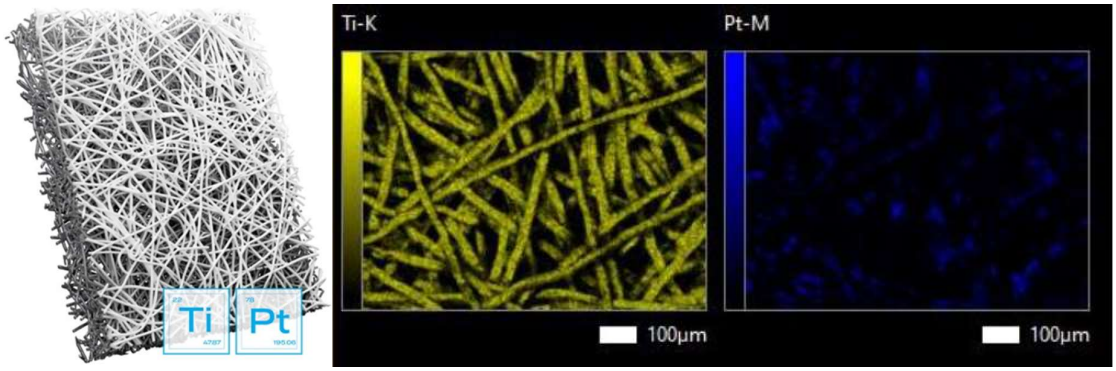

Figure 1. Left: Pt-coated Ti PTL. Right: SEM-EDX micrographs for Pt-coated Ti PTL. Image credits, Bekaert, TNO

Project Objectives: As part of this project, you will investigate the potential of applying ultra-thin, nanoscale platinum coatings using atomic layer deposition (ALD). These advanced coatings will be characterized using techniques such as SEM-EDX and XPS, and their conductivity will be tested further.

Interested? If you are ready to contribute to a greener future and work on this exciting project, reach out to Athina Tzavara Roussi (a.tzavararoussi@tudelft.nl) or Bhavesh Chavan (b.s.chavan@tudelft.nl). The project will be jointly supervised by above PhDs along with prof.dr.ir. Ruud van Ommen.

Take the next step in your academic journey while making a real impact on renewable energy technologies!