Near field electrospinning for electrochemical electrodes

Anders E. Kvåle

University of Bergen & Element One Energy AS

Introduction

The PhD project is developing a novel near-field electrospinning method for preparing 3D structured nanofiber electrodes for electrochemical electrodes. The method can be used for production of several types of electrodes for electrolysis, fuel cells, battery, flow batteries or super capacitors. Advanced 3D structured electrodes can improve conductivity and increase the electrode surface area resulting in enhanced reaction activity. The development is an important measure to improve the capacity and performance of energy storage devices and reduce the need for critical raw materials. The project will focus on electrodes for electrolysis of water and the challenging oxygen evolution reaction, where today solutions require significant use of the critical raw material iridium as catalyst.

Primary objective
- Prepare 3D structured electrodes with nano fibers for improved electrochemical performance with a new novel near field electrospinning method

Secondary objectives
- Fiber optimized for catalyst contact, pores for mass transfer and electron/ proton conductivity
- Reduce ohmic losses at the electrode
- Develop the method for preparing electrodes for batteries, super-capacitors, and other energy storage devices
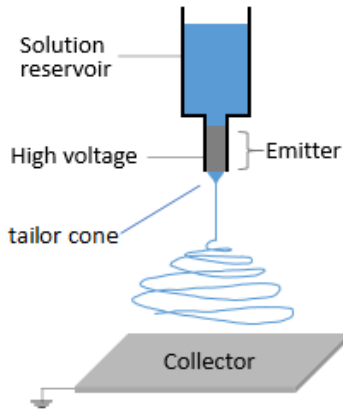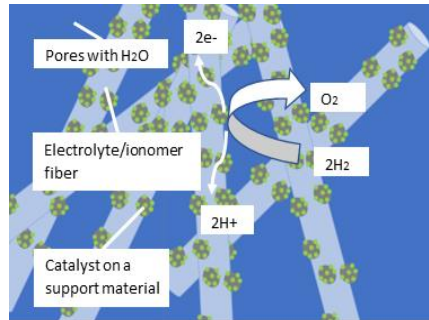

Figure 1 Traditional electrospinning method

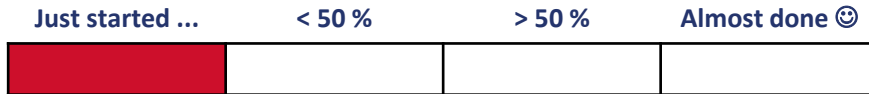Figure 2 Electrospun fibers with electrochemical reaction

I have a M.Sc. Degree in Engineering, Energy and Process from NTNU and worked for a couple of decades in the energy domain. The project is an industrial PhD for my start-up company Element One Energy AS where I am the founder

Estimated progress of the PhD project:

Just started ...	< 50 %	> 50 %	Almost done ☺

Publications
- Preparing a paper "3d structured fiber with novel near-field electrospinning method" and publishing post patent the near field method

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