Co-funded by the European Union

InnoEnergy Skills Institute

Electrodes to Cells

Last revised: 2023 March

In this certification, you will get a unique view into advanced battery labs and knowledge on each step of the cell design process. Specifically, you will explore the essential battery cell production equipment. You will be guided through the key steps of selecting and producing the main components of the cell, i.e., electrodes, separator, and electrolyte. The whole processing flow and assembly process will be explained to you in terms of machinery and the processing parameters.

Learning outcomes

Upon completion of the certification, learners will be able to:

- Differentiate between cylindrical cells and prismatic cells as examples of lithium-ion battery geometries, and estimate the length or the number of electrode layers
- Apply concepts such as capacity, voltage, and energy for designing a lithium-ion battery
- Describe each step of production of a Li-ion battery cell
- Discuss the functions of the electrolyte and separator

Certification structure

The certification is delivered fully online and is self-paced, making it easy for participants to learn without having to take time off work.

The certification consists of seven lessons and is structured as follows:

Lesson 1: Cell Design for Lithium-Ion Batteries

- Get acquainted with some lithium-ion cell terminology and some design considerations.

Lesson 2: Slurry Formulation and Mixing

- Learn what electrode slurry is made of and why certain components are present.

Lesson 3: Electrode Coating

- Learn how to prepare an electrode coating.

Lesson 4: Electrode Drying and Calendering

- Look at the last two critical steps in the production of porous electrodes for lithium-ion batteries: drying and calendering.

Lesson 5: Electrolyte and Separator

- Explore the role and properties of the electrolyte and the separator.

Lesson 6: Cell Assembly

- Look into the final series of steps involved in the assembly of a lithium-ion cell.

Lesson 7: Formation Cycles

- Learn about formation cycles, the electrochemical conditioning steps that should be performed before a cell can actually be used.

Instructors

The certification is led by experts from the EIT InnoEnergy ecosystem. Instructors on this certification are:

An Hardy

Full Professor at Hasselt University, Institute for Materials Research (IMO) & EnergyVille. Specialised in the designed synthesis of inorganic and hybrid (nano)materials for various applications including energy storage and conversion.

Momo Safari

Associate Professor, Department of Engineering Technology, Hasselt University & EnergyVille. The main area of activity is advanced battery technologies and the fundamental research centres around experimental/theoretical investigation of thermodynamics, kinetics, and transport phenomena in batteries.

How will you learn?

This is an online certification and can be taken at your usual study location. The certification consists of seven lessons and is self-paced.

Duration: 4 Hours

Is it right for you?

This certification is beneficial for process, quality, or design engineers who need to understand or apply battery design, and battery material suppliers, but anyone interested in understanding battery cell manufacturing might find it useful.

Prerequisites: Basic general background knowledge in chemistry, physics, and math.

Certificates of Achievement

We offer two pathways for issuing of certificates, **InnoEnergy Skills Institute Certificate** and **EDC (European Digital Credentials),** each with its own unique set of benefits, allowing your organization to choose the one that best suits the objectives. **The Achievement recognition will be awarded at a >75% course assessment pass rate.**

InnoEnergy Skills Institute Certificates

What is it?

The InnoEnergy Skills Institute serves as the certificate issuer, verifying learners' progress and achievements with the course material.

What are the benefits?

InnoEnergy Skills Institute certificates are highly adaptable for recognizing various learning levels and achievements. We offer Participation, Completion, and Achievement certificates for learners who complete online courses through the Skills Institute platform.

What that means for you?

You will receive a digital credential that you can store in your personal digital credential wallet. You can also add and share these credentials on your social media platforms. The authenticity of the credentials can be verified online by anyone seeking credential verification.

European Digital Credentials (europass)

What is it?

European Digital Credentials provide an online record of an individual's personal achievements and qualifications. Recognized by employers across the continent, InnoEnergy Skills Institute can issue European Digital Credentials, which learners can add to their European Digital Credentials wallet. For this type of credentials, we only offer Achievement certificates, awarded at a >75% course assessment pass rate.

What are the benefits?

It allows learners to signal their skills and qualifications using the European Learning Model — a semantic standard that helps the recognition of qualifications and digital credentials across Europe. It also combats fraud, and greatly reduces administrative costs.

What that means for you?

You can be confident in the authenticity of your credentials and showcase your skills in a way that is understood in the context of the European Learning Model. You'll also be able to access everything quickly and easily via your online European Digital Credentials wallet.

Versioning

#	Version	Summary of Changes	Date
1	v1.1	Updated the formatting as per InnoEnergy Colour and Font styles	09-Dec-24