



*Alliance for Batteries Technology, Training and Skills*

2019-2023

## Battery Material Engineer



Co-funded by the  
Erasmus+ Programme  
of the European Union



## Battery Material Engineer

A battery material engineer is responsible for researching, developing and optimizing materials used in batteries. They work with a team of engineers and scientists to design new materials and improve existing materials to increase the performance, safety and cost-effectiveness of batteries. They need to have a strong understanding of materials science, chemistry and electrochemistry, as well as experience with characterization techniques such as SEM, XRD, and electrochemical testing. They also need to have knowledge of battery manufacturing processes and safety protocols. They play a crucial role in developing materials for advanced batteries such as lithium-ion, lithium-sulfur, and solid-state batteries. They also need to be familiar with the regulations and standards related to battery materials and safety.

### ESCO Occupations - [ESCO - Occupations - European Commission \(europa.eu\)](https://ec.europa.eu/esco/)

ID	NAME	Concept URI
2149.11	materials engineer	<a href="http://data.europa.eu/esco/occupation/4a375b68-88a0-4e5f-99ce-9b01341dfb81">http://data.europa.eu/esco/occupation/4a375b68-88a0-4e5f-99ce-9b01341dfb81</a>

### Context

<b>Minimum EQF</b>	6/7/8
<b>Value Chain</b>	Raw Materials and Processing
<b>Departments</b>	Production and Maintenance RnD
<b>Specialisations</b>	Cathode Engineer Anode Engineer Electrolyte Engineer

## Cross-sectoral Specific Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Inspect quality	S	- <b>Validation</b> of battery materials	Practitioner	inspect quality of product
Analysis methods	K	- use analysis methods such as root cause analysis - plan and execute root cause analysis - <b>Design</b> Failure Mode and Effect Analysis (DFMEA)	Expert	
Conformity to specification	S	- <b>assure</b> customer requirements for specific applications of materials	Practitioner	ensure conformity to specifications
Process improvement	S	- <b>evaluate</b> and improve running processes	Expert	ensure conformity to specifications
Manufacturing methods and procedures	K	- <b>design</b> and lead manufacturing engineering methods and procedures of battery materials	Expert	manufacturing processes
Optimization	S	- optimize formulation of materials, such as electrolyte - optimisation of material characteristics	Expert	optimise production
Data analysis	K	- use tools for data analysis	Practitioner	gather data; inspect data; process data
Physical properties	S	- design experiments	Expert	measuring physical properties

## Sector Specific Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Battery materials	K	- Design battery materials for lithium-ion batteries - Develop battery materials for lithium-ion batteries - Optimize materials for lithium-ion batteries	Expert	
Cell design	K	- Understanding of battery cell design in the context of raw materials and its components	Awareness	industrial design
Lithium-ion chemistry	K	- Specialisation in Li-ion battery technology	Expert	battery chemistry
Battery components	K	- Understanding of battery components in the context of raw materials	Awareness	battery components
Battery design	K	- Understanding of battery design in the context of raw materials	Awareness	industrial design
Characterisation techniques	S	- Characterisation and validation of battery material - SEM, XRD, and electrochemical testing	Expert	

## Soft Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Teamwork	K	- work in team within and across different departments - provide engineering support to other teams	Practitioner	Teamwork
Adaptation	S	- adapt to the work environment, issues, and changes in organisation and on the market	Practitioner	Adapt to change
Communication	K	- Work and communicate with external stakeholders - Communicate with team members and across different department teams	Practitioner	Communication

## General Transversal Competence

Name	Type (S/K)	Description/Context	Level	ESCO
Reporting	S	- Create reports and comprehensive technical specifications	Expert	follow reporting procedures
Meet deadlines	S	- Assure meeting deadlines in terms of launch objectives and product qualification	Practitioner	meet deadlines
Planning/scheduling	S	- Planning of experiments	Practitioner	perform planning

## Academic Competence (can be taken from University programme)

Name	Type (S/K)	Description/Context	Level	ESCO
Electrochemistry	K	- University level	Expert	Electrochemistry
Statistics	K	- Use statistical tools	Expert	Statistics
Material science	K	- University level	Expert	Material Science
Chemistry	K	- University level	Expert	Chemistry