

# o coat

Functional Membrane Technologies

Company Profile

## **selective performance membranes**

in life science & biotech

in advanced separation

in food & beverage

in water & wastewater





# Industrial Hardtech Spin-off from Leibniz-Institute

qCoat is a performance materials company from Leipzig. Founded in 2019 as a spin-off from the Leibniz-Institute for Surface Engineering (IOM).

qCoat applies a patented technology to functionalize polymer filter membranes. With lifetime lasting performance effects, roll-to-roll on pilot production level. Clean, without resorting to toxic chemical auxiliaries.



2013 functionalized membranes  
proof-of-concept

2016 various functional  
prototypes, Roll-to-Roll,

2017 H1 pilots in operational  
environment

2018 Q2 first patent granted

2018 Q4 RtR process maturity TRL 7

2019 Q2 company formation  
qCoat GmbH

2020 Q2 patent portfolio expansion

2021 Q1 TGFS joins qCoat

2021 Q2 offering membrane  
functionalization as a B2B  
service and license model



qCoat plans to scale up and commission a 40-inch industrial grade membrane treatment facility in Saxony in 2025/26.



# Polymer Membranes – Modern Filter Technology in Many Applications

qCoat provides high performance coatings and functionalization on standard polymer filtration membranes. For membrane manufacturers and filter module producers.

qCoat's technology is applicable on a broad range of porous polymer membranes with different geometries.

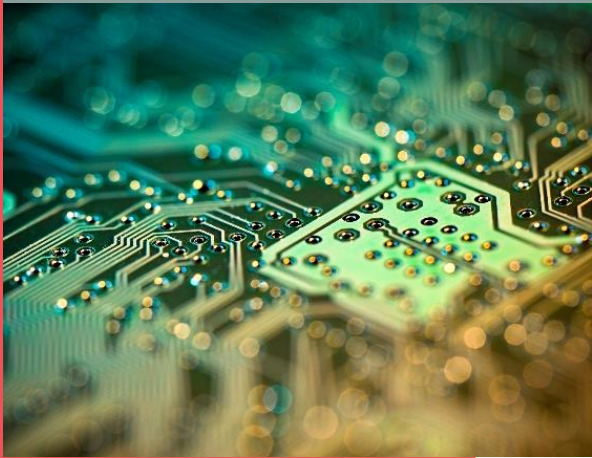




## biotech & bioproduction

functional membrane filters in biotech downstream production, chromatography membranes, antibody and protein separation

membranes with highest throughput in bio-coupling and affinity capabilities  
tailored active properties



## advanced separation

functional membrane filters in ultra-purification challenges. Ion exchange and catalytic membrane reactors.

membranes achieve new standards in extreme purification levels,  
enlarged throughput, tailored active properties



## food & beverage

Hy2F® functional membrane filters in drinking water production, wine, beer and fruit juice clarification and dairy processing.

operations with extended maintenance intervals  
enlarged throughput, low fouling

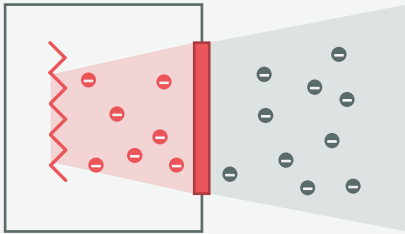


## water & wastewater

Hy2F® functional membrane filters in industrial process and municipal wastewater treatment, e.g. membrane bioreactors

operations at 25% less energy consumption  
enlarged flux  
fouling control

# Platform Technology – Fast Electrons Trigger Membrane Functionalization



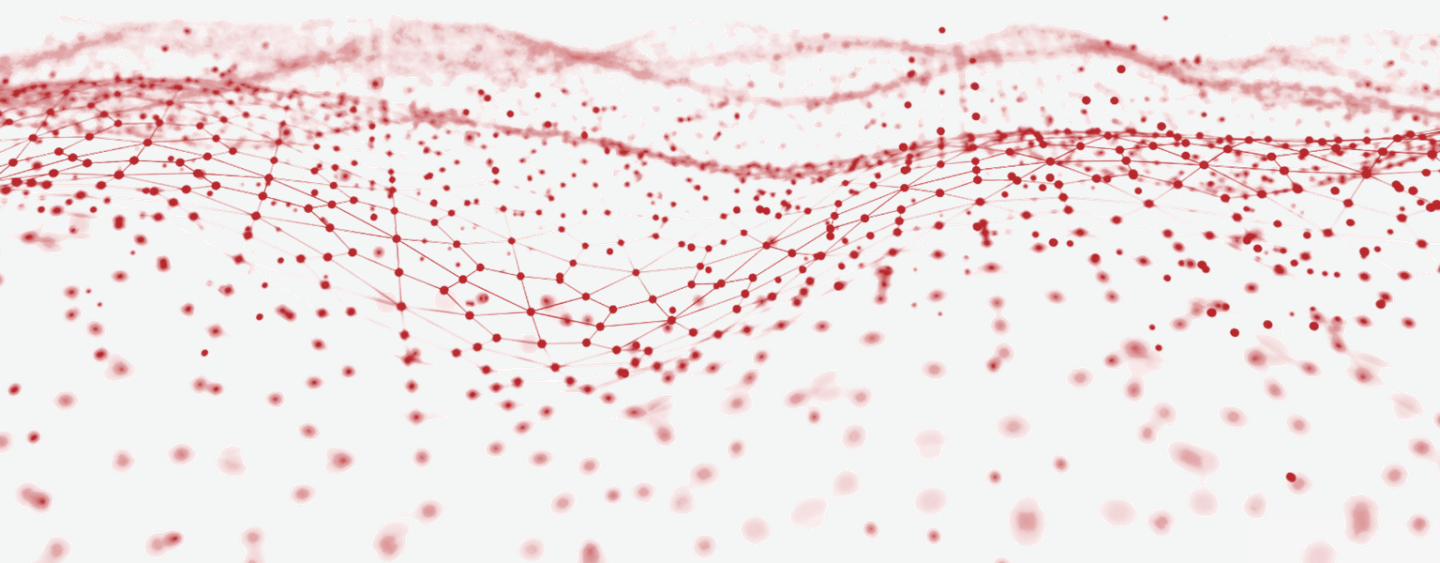
Electron radiation is generated by applying a high voltage to tungsten wire filaments in a vacuum. The voltage heats the filaments and generates free electrons. After applying an accelerating voltage, the free electrons are directed towards the titanium window. The electrons exit the vacuum tube and strike the membrane emerging from a solution containing functional molecules.

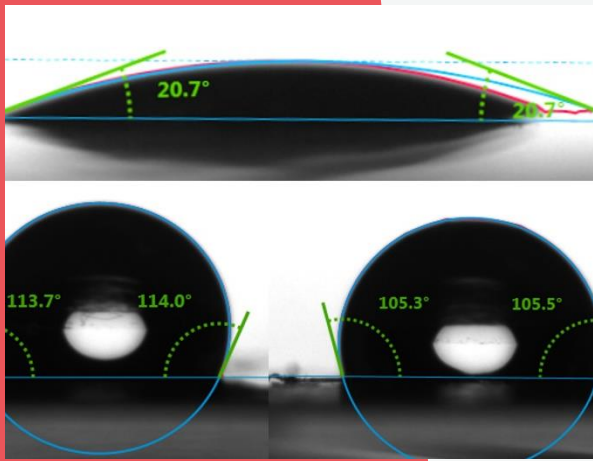
Electron beams can reach high velocities, generally 50-70% of the speed of light. Electrons are also about 20,000 times more energetic than UV photons. An advantage of this technique is that the energy deposition of the electron beam does not depend on the optical density of the material.

Electron beam irradiation breaks molecular chains in the membrane and generates reactive radicals. As the electron beam penetrates the entire bulk of polymer membrane, this activation is performed on the visible outside as well as deep inside the pores of the membrane. Milliseconds after the activation, stable covalent chemical bonds appear between the membrane and the functional groups or even active biomolecules such as enzymes and proteins.

As a side effect of electron beam irradiation, the membrane bulk undergoes a crosslinking and post-polymerization leading to improved mechanical and chemical performance characteristics.

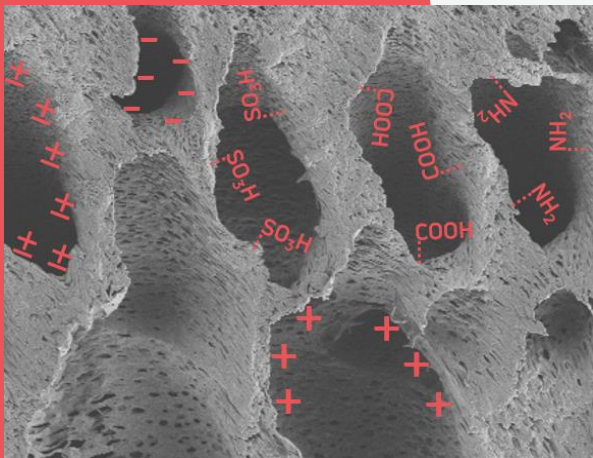
## What Happens with Membranes under Electron Beam Treatment?





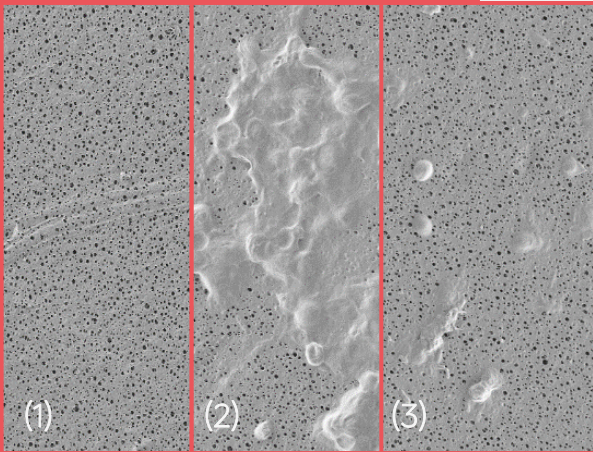
## higher flow rate, strong hydrophilic

Functionalization with different functional molecules gives the membrane surface a higher hydrophilicity. Such water-loving membranes increase throughput which in turns results in cost savings for the end user, as less membrane area is required.



## surface charge

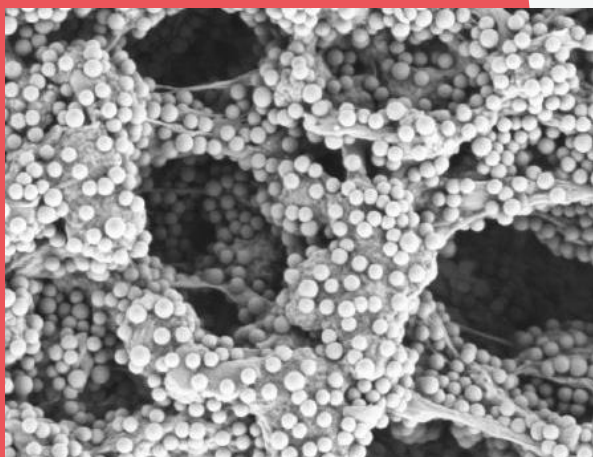
By functionalization with different functional groups, the surface charge and thus also the adsorption capacity of the membrane can be specifically adjusted. Such membranes are used, e. g. in membrane chromatography or for ion exchange.



## fouling inhibition, protein adsorption

Various functionalities lead to a reduced tendency for protein adsorption and less fouling by reducing adsorption probabilities of suspended foulants.

- (1) virgin PES UF-membrane
- (2) algae fouled membrane
- (3) functionalized membrane with lower algae fouling

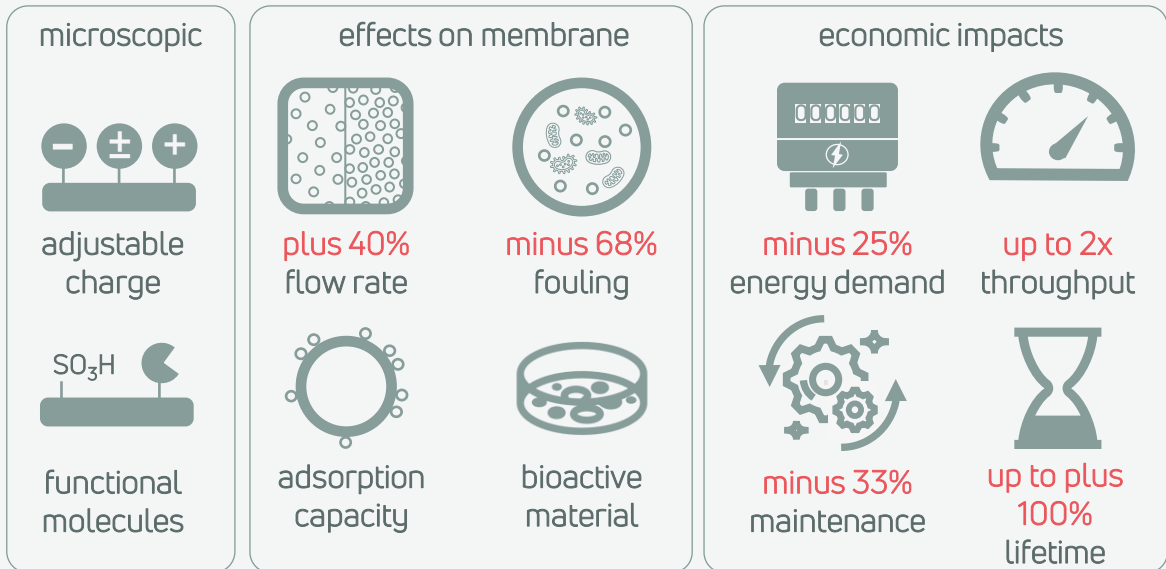


## advanced functionalities

Further developments for advanced functionalities include e. g. the immobilization of oxidase and digestive enzymes, antibacterial peptides, photosensitizers and carbon nanotubes.

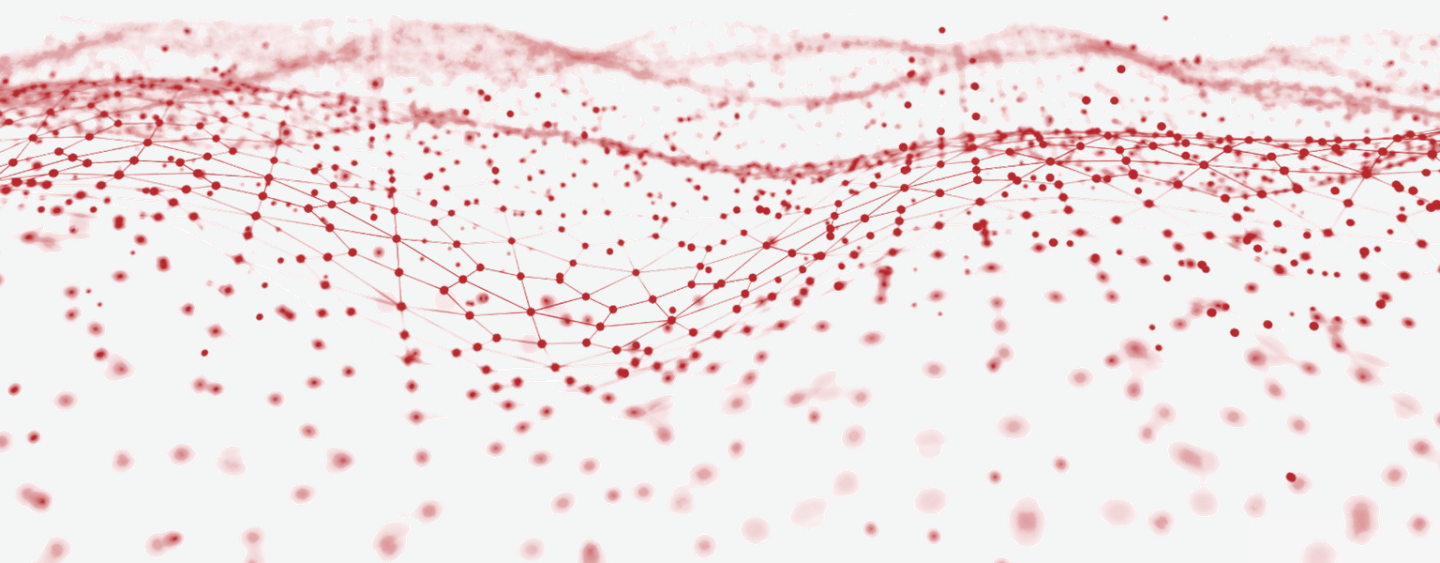
# Customer Benefits

qCoat offers novel functionalities to the entire bulk of the membrane. qCoat is unique as our membrane coatings ensure advanced performance levels over the entire membrane lifetime.



With Hy2F<sup>®</sup> coating a super hydrophilic membrane is obtained with a significantly improved permeability resulting in reduction in energy consumption and shorter processing times. The fouling tendency is reduced enhancing the membrane life span and lowering maintenance.

qCoats qIEX and qBio present a solution for applications where recognition of either biomolecules or charge is needed. Challenges like complex mixtures with small concentration of the target molecule as well as selective enhanced migration of charged moieties can be performed while increasing the process productivity at the same time.



# Passionate for Sustainable Water

No barriers to entry – functional membrane technologies help solve circular water. Our mission is to deliver a hardtech answer to rapid urbanization, climate change, and global water resource depletion.

qCoat-advanced membranes deliver on



Delivering of clean drinking water for less.  
Helping to reduce health risks.  
Controlling the spread of waterborne diseases.



Promoting the universal and equitable access to clean water and hygiene.  
Reduce water pollution and protect related eco-systems.



Upgrading existing water treatment infrastructure and level up efficiency.



Cutting energy demand as part of general decrease in operational costs.  
Funds can be used to initiate novel urban water treatment and preserve the rural biodiversity.



Advanced separation technologies become part of the circular economy and help stop world's resource depletion.



# Our Service for You

qCoat works for membrane and module manufacturers seeking to advance the attractiveness of their membrane products and expand their competitive edge.

## **You have an application and need a customized membrane?**

We help develop and select the right membrane.

We perform sampling processes, so that you can investigate the functionalized membrane in your application.

## **You are a membranes manufacturer and want to improve your membrane?**

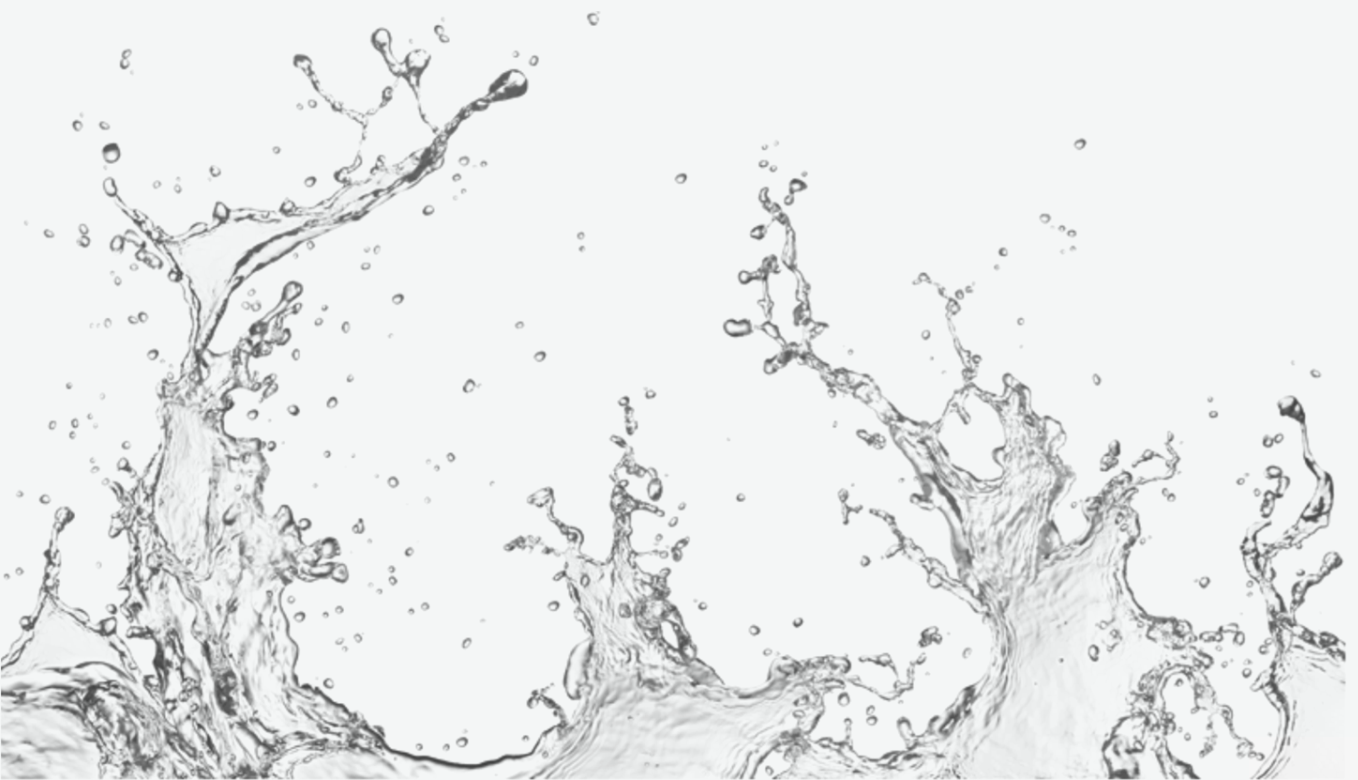
We will consult you on the possibilities of membrane functionalization.

From small series to regular functionalization or industrial production, we support your ideas.

## **You are a module manufacturer and want to establish a new product series?**

We have experience in the functionalization of commercially available membranes from many application areas.

Share your idea with us and new business areas will open up.



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— selective performance membranes

qCoat GmbH · Permoserstrasse 15 · 04318 Leipzig · GERMANY  
qCoat.de · contact@qCoat.de · +49341 235 3104  
managing directors · Dr. Alexander Braun · Christian Wunderlich

supported by



**SPINLAB** THE HHL  
ACCELERATOR



**eit** Climate-KIC



**IOM** Leibniz Institute of  
Surface Engineering



Europa fördert Sachsen.



Technologietransfer