Development of an Electrospraying/Electrospinning device

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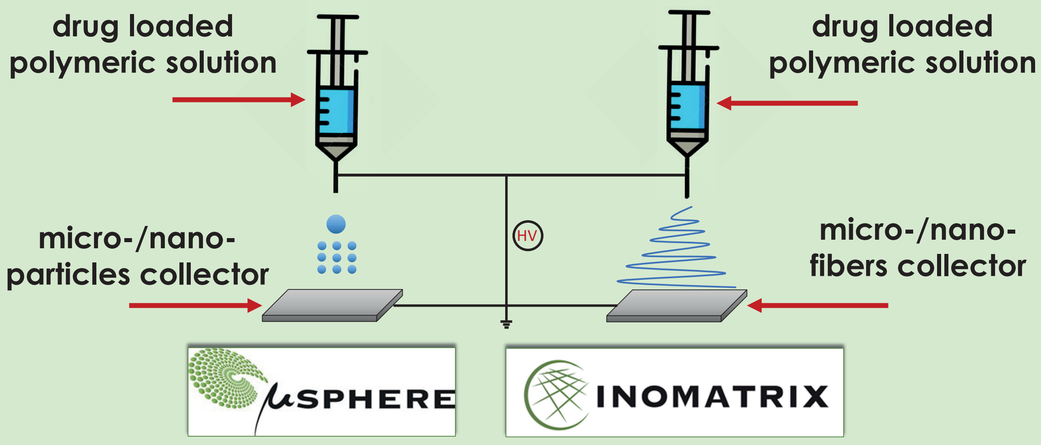
Electrostatic Methods



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By using the Finite Elements Method, it allows to model, simulate and solve the multiphysics problem by detailed description of the features of the phenomena.

Process development?

- **Modeling and design a needleless electrospraying/electrospinning apparatus,**

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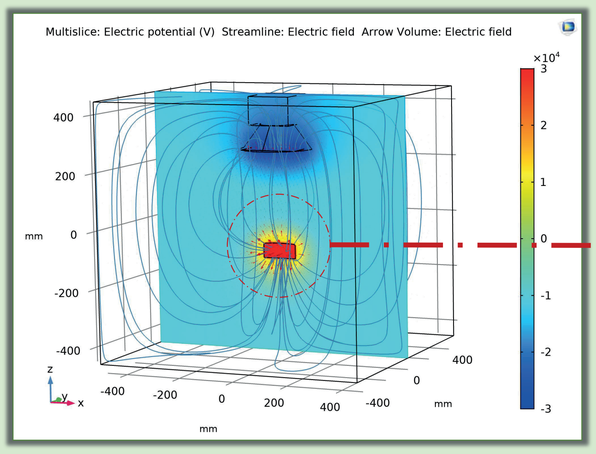
- **Manufacturing of the elements and characterisation of an experimental data.**

INOCURE Engineering Team

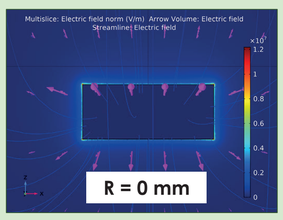
Theoretical analysis

Electrostatic Potential & Electric Field as the crucial parameters to increase the productivity of particles and fibers .

Electrostatic Potential distribution



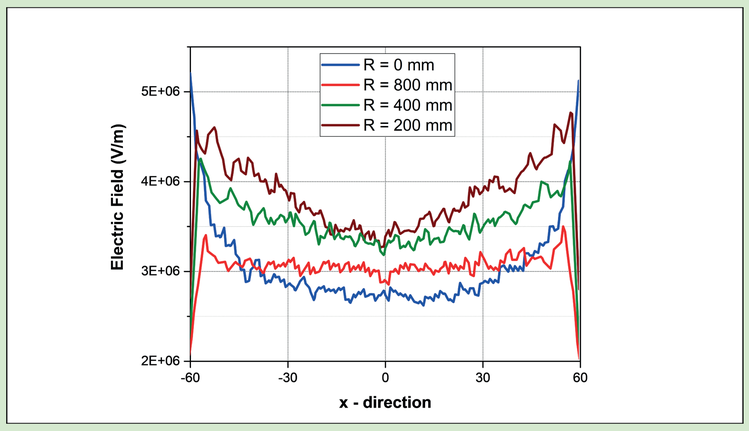
The Electrostatic Potential decreases toward to collector.

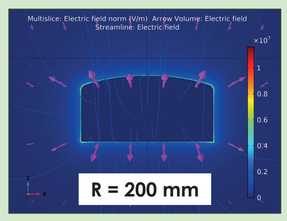


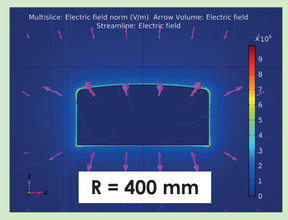
$$\kappa = \frac{1}{R}$$

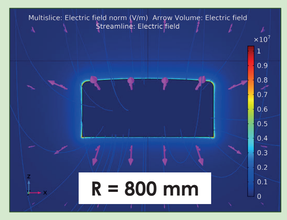
curvature – radius relation

How the curvature of the emitting/spinning surface affects the electric field profile of the element?









Increasing the curvature of the emitter/spinneret leads to an enhancement of the Electric Field generated by the electrode itself.

Practical use

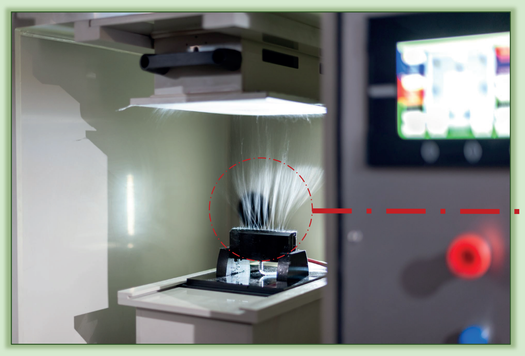
We have designed the compact, flexible and intuitive electrospraying/electrospinning device.

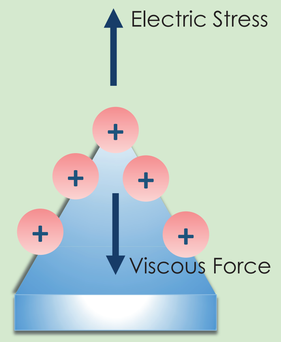
Modular electrospraying/electrospinning apparatus

- **High-throughput production,**
- **Intuitive software,**
- **Regulation of the humidity and the temperature,**
- **Flexible setups,**
- **Static/rotation collectors,**
- **Needle/needleless electrodes.**

INOSPIN

An optimized needleless electrode

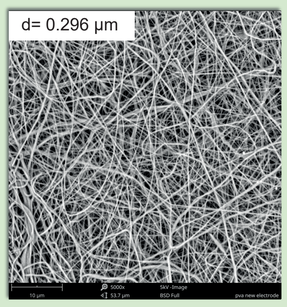




Taylor Cone

The needleless emitter/spinneret allows for multiple Taylor cone formation, many particles/fibers can be fabricated, increasing the productivity of the electrospraying/electrospinning process.

Nanofibers



Very thin fibers can be formed (with diameter below 1 µm).

Applications

Our study greatly helps to choose the proper emitter/spinneret for many applications:

- **Biomedical applications (wound dressing for skin regeneration, stem cell, drug delivery),**
- **Filtration (nanofibers can be used as a great filters to remove the pollutants from the water and the air),**
- **Tissue engineering scaffolds,**
- **Chemical applications, e.g. producing innovative nanomaterials for cell and batteries use.**

Contact us!

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