Comments for Authors

Dear Authors,

The paper needs to be improved to raise the overall quality level for publication in Membranes. The following points are necessary to be addressed and clarified.

The Authors claim that the present work aims at analysing the application of nanofibers in different fields, such as sensors, catalysis, environmental, energy, electronics and medicine. However, the cited literature appears to be unsufficient for a review and must be improved at least as suggested below:

1) In Section 2 the Authors explain the electrospinning process. There are some parts to be fixed and several statements requiring proper literature data as support.

   - Page 2, line 69: replace injection rate with flow rate (check all the manuscript and remove the inappropriate term everywhere);

   - Page 2, line 70: the collector type does not belong to the electrospinning process parameters; instead, it is a setup option. Check all the text and fix it everywhere;

   - Page 3, lines 75-77: Among the solution parameters, the volatility is a key factor affecting the electrospinning process and the nanofiber morphology. Please discuss this parameter, citing proper literature.

     For example:
     • the use of volatile solvents helps at obtaining dry fibers, while the risk of easier clogging of the needles is more frequent (Effects of parameters on nanofiber diameter determined from electrospinning model, https://doi.org/10.1016/j.polymer.2007.09.017);
     • the addition of a volatile co-solvent may help at improving the electrospinning process and the nanofibers quality (Role of chain entanglements on fiber formation during electrospinning of polymer solutions: good solvent, non-specific polymer–polymer interaction limit, https://doi.org/10.1016/j.polymer.2005.03.011).

   - Page 3, line 102: The Authors affirm that “Higher conductivity values are generally obtained by adding salt”. However, to doing this, it is more common the addition of a co-solvent with increased conductivity, since the salt addition may strongly affect solution viscosity, besides its presence also in the dry nanofibers that could prevent their use in some applications. However, in some cases, as in the Nomex electrospinning, the addition of salts as LiCl and $CaCl_2$ is mandatory to obtain the polymer dissolution (Fabrication of electrospun meta-aramid nanofibers in different solvent systems, https://doi.org/10.1007/s12221-010-1032-6);

   - In the Section 2.2.1 the effect of using a plate or a rotating drum as collector on the nanofibers morphology and deposition is discussed. The different nanofiber disposition directly reflects on their mechanical properties, achieving improved tensile properties when the nanofibers are aligned. Please discuss about the mechanical properties citing proper literature (Tension Stimulation of Tenocytes in Aligned Hyaluronic Acid/Platelet-

Rich Plasma-Polycaprolactone Core-Sheath Nanofiber Membrane Scaffold for Tendon Tissue Engineering, https://doi.org/10.3390/ijms222011215; Laminin-Coated Electrospun Regenerated Silk Fibroin Mats Promote Neural Progenitor Cell Proliferation, Differentiation, and Survival in vitro, https://doi.org/10.3389/fbioe.2019.00190; A New Wood Surface Flame-Retardant Based on Poly-m-Aramid Electrospun Nanofibers, https://doi.org/10.1002/pen.25235; The Effect of Aligned and Random Electrospun Fibrous Scaffolds on Rat Mesenchymal Stem Cell Proliferation);

- In Figure 3, please add the effect of viscosity also in the “small diameter” case;

2) In the Section 2.2.2 (Core/shell fibers) the Authors affirm that emulsion electrospinning can be conducted using immiscible polymers. This is right. However, it is not mandatory for two immiscible polymers leading to the formation of a core-shell or multi core-shell nanofibrous structure. Indeed, the polymer pair can form a homogeneous solution and, in such case, the resulting nanofiber is a blend of the homopolymers. Please clarify in the manuscript the difference between blend electrospinning and emulsion electrospinning to avoid misunderstanding in the reader, adding the following literature data:

Electrospinning of immiscible systems: The wool keratin/polyamide-6 case study https://doi.org/10.1016/j.matdes.2017.04.045

Rubbery nanofibers by co-electrospinning of almost immiscible NBR and PCL blends https://doi.org/10.1016/j.matdes.2019.108210

Electrospun Polymer Blend Nanofibers for Tunable Drug Delivery: The Role of Transformative Phase Separation on Controlling the Release Rate https://doi.org/10.1021/acs.molpharmaceut.5b00359

Multicore-shell nanofiber architecture of polyimide/polyvinylidene fluoride blend for thermal and long-term stability of lithium ion battery separator https://doi.org/10.1038/srep36977

Preparation of oil-in-water core-sheath nanofibers through emulsion electrospinning for phase change temperature regulation https://doi.org/10.1016/j.polymer.2022.125252

The creation of blend nanofibers or core-shell ones may also derive from the particular polymer pair, as demonstrated by the electrospinning of nitrile rubber (NBR) with polycaprolactone (PCL) or Nomex: in the first case blend nanofibers are obtained (Rubbery nanofibers by co-electrospinning of almost immiscible NBR and PCL blends https://doi.org/10.1016/j.matdes.2019.108210), while in the other case nanofibers reminescent of core-shell nanofibers (Self-Assembled NBR/Nomex Nanofibers as Lightweight Rubbery Nonwovens for Hindering Delamination in Epoxy CFRPs https://doi.org/10.1021/acsami.1c17643).

This book chapter can provide some hints about polymer blends:
Comprehensive Polymer Science and Supplements: 5 - Polymer Blends https://doi.org/10.1016/B978-0-08-096701-1.00042-2

3) On page 8, lines 270-277, the Authors report the use of nanofibers for reinforcing composite materials, but this application field of nanofibers was not declared in the abstrat not elsewhere in the manuscipt. Please add this application field along with the others and add more examples of nanofiber use in composite materials for improving specific properties, such as the interlaminar fracture toughness and damping.

   Synergetic improvement of interlaminar fracture energy in carbon fiber/epoxy composites with nylon nanofiber/polycaprolactone blend interleaves
   https://doi.org/10.1016/j.compositesb.2019.05.004

   Rubbery-modified cfrps with improved mode i fracture toughness: Effect of nanofibrous mat grammage and positioning on tanδ behaviour
   https://doi.org/10.3390/polym13121918

   Interdiffusing core-shell nanofiber interleaved composites for excellent Mode I and Mode II delamination resistance
   https://doi.org/10.1016/j.compscitech.2019.03.019

   Damping and mechanical behaviour of composite laminates interleaved with rubbery nanofibers
   https://doi.org/10.1016/j.compstruct.2021.114228

   Recent advances in core/shell bicomponent fibers and nanofibers: A review
   https://doi.org/10.1002/app.46265

4) Revise the entire Section 2 deleting redundant parts and improving the general explanation of the electrospinning process and parameters (take into consideration also the works of eminent experts on the electrospinning process, as Darrell Reneker, Seeram Ramakrishna and Alexander Yarin).

Other points

5) Page 1, lines 39-40: Usually, in the case of nanofibers, diameters below the micrometer (sub-micrometric dimensions) are sufficient to consider the fiber a “nanofiber”. Please fix it.
6) Page 1, line 41: “Generally, nanoparticles exhibit a larger surface area than nanofibers.” Are the Authors sure?
7) Page 2, lines 56-57: “...application of a high-voltage electric field...” Please, write high-voltage or high electric field.
8) In the sentence on page 2, lines 66-68, please add the volatility.
9) Page 2, line 70: remove the collector type.
10) Page 2, line 71: What do the Authors mean with “air velocity”? Please clarify this point
11) Page 3, line 84: “...or fibers with beads occurs.”
12) Page 3, line 96: “... Taylor cone and jet formation.”
13) Page 3, line 110: Remove the collector type.
14) Page 4, lines 113-114: “The solution speed is lower, therefore the time for the fibers to dry before reaching the collector is longer [18,19].” What do the Authors want to highlight with this affirmation? Please clarify this point.