

Yong IL Kim

DOCTOR COURSE



Solar Cell & Aerosol Science Laboratory

School of Mechanical Engineering

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RESEARCH INTERESTS

- Electrohydrodynamics (electrospinning/electrospray applications)
- Nanofibers (polymer, metal, and ceramic)
- Membrane (water/oil separation, water purification, and biocompatible anti-fungal membrane, air filter)
- Photocatalysis applications (water purification, water splitting, and anti-microbial activity)
- Heat transfer applications (air cooling layer, pool boiling, and transparent heater film)
- Self-healing composites
- Metal-organic frameworks (MOFs)
- Transparent conductive electrodes (TCEs)
- Supersonic gas flow
- Energy storage (Li-ion battery and supercapacitor)
- Soft actuator/robot
- Nano generator

EDUCATION

- Doctor course in Mechanical Engineering, (4.12/4.5)
Korea University, Seoul, Korea
Advisor: Prof. Sam S. Yoon
- Master course in Mechanical Engineering, (4.08/4.5)
Korea University, Seoul, Korea
Advisor: Prof. Sam S. Yoon
- Bachelor of Science in Mechanical Engineering, Aug. 2015 (3.00/4.5)
Korea University, Seoul, Korea
Advisor: Prof. Sam S. Yoon
Senior Dissertation: Experimental study of nano-textured Cu₂O nanofiber film for efficient air cooling

EMPLOYMENT

- 2016/Sep. to 2016/Dec.: Teaching Assistant, School of Mechanical Engineering, **Korea University**, Creativity in machine design: capstone design.
- 2017/Mar. to 2017/June.: Teaching Assistant, School of Mechanical Engineering, **Korea University**, Fluid mechanics II.
- 2017/Sep. to 2017/Dec.: Teaching Assistant, School of Mechanical Engineering, **Korea University**, Fluid mechanics II.
- 2018/Mar. to 2018/June.: Teaching Assistant, School of Mechanical Engineering, **Korea University**, Integrated design.
- 2018/Sep. to 2018/Dec.: Teaching Assistant, School of Mechanical Engineering, **Korea University**, Applied Fluid mechanics.
- 2019/Mar. to 2019/June.: Teaching Assistant, School of Mechanical Engineering, **Korea University**, Fluid mechanics II.
- 2019/Sep. to 2019/Dec.: Teaching Assistant, School of Mechanical Engineering, **Korea University**, Fluid mechanics I.

AWARDS

- Research Incentive Scholarship (Excellent Paper Award), **Korea University**, 2021.
- KU Graduate Student Achievement Award, **Korea University**, 2021.

PUBLICATIONS ([†]equal contribution, *corresponding author)

International Journal Papers (48 published, under review, 0 submitted)

1. B Joshi[†], E Samuel[†], **YI Kim**, AL Yarin*, MT Swihart*, SS Yoon*, Review of recent progress in electrospinning-derived freestanding and binder-free electrodes for supercapacitors, **Coordination Chemistry Reviews** (IF=22.315), 460, 214466, 2022.
2. **YI Kim**[†], BH Bang[†], K Jang, S An*, AL Yarin*, SS Yoon*, Pool boiling enhancement via nanotexturing and self-propelled swing motion for bubble shedding, **International Communications in Heat and Mass Transfer** (IF=5.683), 133, 105934, 2022.
3. T Kim, C Park, **YI Kim**, A Aldalbahi, M El-Newehy, S An*, SS Yoon*, Enhancing solar radiant heat transfer using supersonically sprayed rGO/AgNW textured surfaces, **International Journal of Precision Engineering and Manufacturing-Green Technology** (IF=5.671), 1-11, 2022.
4. **YI Kim**[†], BH Bang[†], K Jang, S An*, AL Yarin*, SS Yoon*, Effect of heater wire configuration and nanotexturing on force generated by self-propelled bubble-driven propeller, **International Journal of Heat and Mass Transfer** (IF=4.947), 184, 122274, 2022.
5. T Kim[†], C Park[†], EP Samuel, **YI Kim**, S An*, SS Yoon*, Wearable sensors and supercapacitors using electroplated-Ni/ZnO antibacterial fabric, **Journal of Materials Science & Technology** (IF=8.067), 100, 254-264, 2022.

6. B Joshi, E Samuel, **YI Kim**, AL Yarin*, MT Swihart*, SS Yoon*, Progress and potential of electrospinning-derived substrate-free and binder-free lithium-ion battery electrodes, ***Chemical Engineering Journal*** (IF=13.273), 430, 132876, 2022.
7. B Joshi, E Samuel, **YI Kim**, T Kim, M El-Newehy, A Aldalbahi*, SS Yoon*, Electrospun zinc-manganese bimetallic oxide carbon nanofibers as freestanding supercapacitor electrodes, ***International Journal of Energy Research*** (IF=5.164), Online version, 2022.
8. **YI Kim**, S An*, C Park, T Kim, A Aldalbahi, MR Hatshan, AL Yarin*, SS Yoon*, Nanotextured soft electrothermo-pneumatic actuator for constructing lightweight, integrated, and untethered soft robotics, ***Soft Robotics*** (IF=8.071), 2021.
9. E Samuel†, B Joshi†, **YI Kim**, C Park, A Aldalbahi, M El-Newehy, HS Lee*, SS Yoon*, Cotton fabric decorated with manganese oxide nanorods as a supercapacitive flexible electrode for wearable electronics, ***Applied Surface Science*** (IF=6.707), 568, 150968, 2021.
10. **YI Kim**†, S An†, AL Yarin*, SS Yoon*, Performance enhancement of soft nanotextured thermopneumatic actuator by incorporating silver nanowires into elastomer body, ***Soft Robotics*** (IF=6.160), 2021.
11. MW Kim†, **YI Kim**†, C Park, A Aldalbahi, HS Alanazi, S An*, AL Yarin*, SS Yoon*, Reusable and durable electrostatic air filter based on hybrid metallized microfibers decorated with metal-organic-framework nanocrystals, ***Journal of Materials Science & Technology*** (IF=6.155), 85, 44-55, 2021.
12. **YI Kim**†, E Samuel†, B Joshi, C Park, H Lee*, SS Yoon*, Flexible metallized carbon nanofibers decorated with two-dimensional NiGa₂S₄ nanosheets as supercapacitor electrodes, ***Chemical Engineering Journal*** (IF=10.652), 420, 130497, 2021.
13. B Joshi†, E Samuel†, C Park, **YI Kim**, HS Lee*, SS Yoon*, Bimetallic ZnFe₂O₄ nanosheets prepared via electrodeposition as binder-free high-performance supercapacitor electrodes, ***Applied Surface Science*** (IF=6.182), 559, 149951, 2021.
14. **YI Kim**†, K Jang†, C Park, S An*, AL Yarin*, SS Yoon*, Enhanced cooling of high-power microelectronics with swing-like pool boiling, ***International Communications in Heat and Mass Transfer*** (IF=3.971), 125, 105338, 2021.
15. B Joshi, E Samuel, **YI Kim**, AL Yarin*, MT Swihart*, SS Yoon*, Electrostatically sprayed nanostructured electrodes for energy conversion and storage devices, ***Advanced Functional Materials*** (IF=16.836), 31, 14, 2008181, 2021.
16. C Park†, T Kim†, **YI Kim**, A Aldalbahi, MR Hatshan, S An*, SS Yoon*, Pool boiling enhancement using hierarchically structured ZnO nanowires grown via electrospaying and chemical bath deposition, ***Applied Thermal Engineering*** (IF=4.026), 187, 116553, 2021.
17. B Joshi†, E Samuel†, **YI Kim**, G Periyasami, M Rahaman, SS Yoon*, Bimetallic zeolitic imidazolate framework-derived substrate-free anode with superior cyclability for high-capacity lithium-ion batteries, ***Journal of Materials & Technology*** (IF=5.289), 67, 116-126, 2021.
18. T Kim†, EP Samuel†, C Park, **YI Kim**, A Aldalbahi, F Alotaibi, SS Yoon*, Wearable fabric supercapacitors using supersonically sprayed reduced graphene and tin oxide, ***Journal of Alloys and Compounds*** (IF=4.650), 856, 157902, 2021.

19. **YI Kim**[†], MW Kim[†], S An*, AL Yarin*, SS Yoon*, Reusable filters augmented with heating microfibers for antibacterial and antiviral sterilization, ***ACS Applied Materials & Interfaces*** (IF=8.758), 13, 1, 857-867, 2021.
20. BH Bang, **YI Kim**, CS Ahn, S Jeong, Y Yoon, S An, SS Yoon, AL Yarin*, Theoretical model of swirling thick film flow inside converging nozzles of various geometries, ***Fuel*** (IF=5.128), 280, 118215, 2020.
21. TG Kim, CW Park, **YI Kim**, A Aldalbahi, M Rahaman, SS Yoon*, Supersonically sprayed carbon nanotubes and silver nanowires as efficient heat spreaders and cooling films, ***Journal of Applied Physics*** (IF=2.546), 127, 10, 105105, 2020.
22. E Samuel[†], B Joshi[†], **YI Kim**, A Aldalbahi, M Rahaman, SS Yoon*, ZnO/MnO_x nanoflowers for high-performance supercapacitor electrodes, ***ACS Sustainable Chemistry & Engineering*** (IF=7.632), 8 (9), 3697-3708, 2020.
23. BH Bang, **YI Kim**, S Jeong, Y Yoon, AL Yarin, SS Yoon*, Theoretical model for swirling thin film flows inside nozzles with converging-diverging shapes, ***Applied Mathematical Modelling*** (IF=2.841), 76, 607-616, 2020.
24. E Samuel, B Joshi, MW Kim, **YI Kim**, MT Swihart, SS Yoon*, Hierarchical zeolitic imidazolate framework-derived manganese-doped zinc oxide decorated carbon nanofiber electrodes for high performance flexible supercapacitors, ***Chemical Engineering Journal*** (IF=8.355), 371, 657-665, 2019.
25. **YI Kim**, S An, MW Kim, HS Jo, TG Kim, MT Swihart, AL Yarin, SS Yoon*, Highly transparent, conducting, body-attachable metallized fibers as a flexible and stretchable film, ***Journal of Alloys and Compounds*** (IF=4.175), 790, 1127-1136, 2019.
26. JH Hong, S An, KY Song, **YI Kim**, AL Yarin, JJ Kim, SS Yoon*, Eco-friendly lignin nanofiber mat for protection of wood against attacks by environmentally hazardous fungi, ***Polymer Testing*** (IF=2.943), 74, 113-118, 2019.
27. **YI Kim**, E Samuel, B Joshi, MW Kim, TG Kim, MT Swihart, SS Yoon*, Highly efficient electrodes for supercapacitors using silver-plated carbon nanofibers with enhanced mechanical flexibility and long-term stability, ***Chemical Engineering Journal*** (IF=8.355), 353, 189-196, 2018.
28. B Joshi, E Samuel, TG Kim, CW Park, **YI Kim**, MT Swihart, WY Yoon, SS Yoon*, Supersonically spray-coated zinc ferrite/graphitic-carbon nitride composite as a stable high-capacity anode material for lithium-ion batteries, ***Journal of Alloys and Compounds*** (IF=4.175), 768, 525-534, 2018.
29. B Joshi, E Samuel, **YI Kim**, MW Kim, HS Jo, MT Swihart, WY Yoon, SS Yoon*, Hierarchically designed ZIF-8-derived Ni@ZnO/carbon nanofiber freestanding composite for stable Li storage, ***Chemical Engineering Journal*** (IF=8.355), 351, 127-134, 2018.
30. MW Kim, B Joshi, E Samuel, K Kim, **YI Kim**, TG Kim, MT Swihart, SS Yoon*, Highly nanotextured β -Bi₂O₃ pillars by electrostatic spray deposition as photoanodes for solar water splitting, ***Journal of Alloys and Compounds*** (IF=4.175), 764, 881-889, 2018.
31. BH Bang, MW Kim, **YI Kim**, SS Yoon*, Growth rate and oscillation frequency of electrified jet and droplet: Effects of charge and electric field, ***Aerosol Science and Technology*** (IF=2.042), 52, 9, 1070-1082, 2018.
32. E Samuel[†], B Joshi[†], MW Kim, **YI Kim**, S Park, TG Kim, MT Swihart, WY Yoon*, SS

- Yoon*, Zeolitic imidazolate framework-8 derived zinc oxide/carbon nanofiber as freestanding electrodes for lithium storage in lithium-ion batteries, *Journal of Power Sources* (IF=9.127), 395, 15, 349-357, 2018.
33. MW Lee, S An, **YI Kim**, SS Yoon*, AL, Yarin*, Self-healing three-dimensional bulk materials based on core-shell nanofibers, *Chemical Engineering Journal* (IF=6.216), 334, 1093-1100, 2018.
 34. S An[†], **YI Kim**[†], HS Jo, MW Kim, MT Swihart, AL Yarin*, SS Yoon*, Oxidation-resistant metallized nanofibers as transparent conducting films and heaters, *Acta Materialia* (IF=7.293), 143, 174-180, 2018.
 35. HS Jo[†], S An[†], XH Nguyen, **YI Kim**, SC James, J Choi*, SS Yoon*, Modifying capillary pressure and boiling regime of micro-porous wicks textured with graphene oxide, *Applied Thermal Engineering* (IF=3.043), 128, 1605-1610, 2018.
 36. EP Samuel[†], BN Joshi[†], HS Jo, **YI Kim**, MT Swihart, JM Yun, KH Kim*, SS Yoon*, Flexible and freestanding core-shell SnO_x/carbon nanofiber mats for high-performance supercapacitors, *Journal of Alloys and Compounds* (IF=3.133), 728, 1362-1371, 2017.
 37. S An, **YI Kim**, JY Yoon, AL Yarin*, SS Yoon*, Wetting of inclined nano-textured surfaces by self-healing agents, *Applied Physics Letters* (IF=3.411), 111, 234101, 2017
 38. EP Samuel[†], HS Jo[†], BH Joshi, HG Park, **YI Kim**, S An, MT Swihart, JM Yun, KH Kim*, SS Yoon*, High-performance supercapacitors using flexible and freestanding MnO_x/carbamide carbon nanofibers, *Applied Surface Science* (IF=3.150), 423, 210-218, 2017.
 39. EP Samuel[†], BH Joshi[†], HS Jo, **YI Kim**, S An, MT Swihart, JM Yun, KH Kim*, SS Yoon*, Carbon nanofibers decorated with FeO_x nanoparticles as a flexible electrode material for symmetric supercapacitors, *Chemical Engineering Journal* (IF=6.216), 328, 776-784, 2017.
 40. HS Jo[†], MW Kim[†], K Kim, S An, **YI Kim**, SC James, J Choi*, SS Yoon*, Effects of capillarity on pool boiling using nanotextured surfaces through electrosprayed BiVO₄ nanopillars, *Chemical Engineering Science* (IF=2.750), 171, 360-367, 2017.
 41. BN Joshi[†], EP Samuel[†], HS Jo, **YI Kim**, S Park, MT Swihart, WY Yoon*, SS Yoon*, Carbon nanofibers loaded with carbon nanotubes and iron oxide as flexible freestanding lithium-ion battery anodes, *Electrochimica Acta* (IF=4.798), 253, 179-488, 2017.
 42. S An[†], **YI Kim**[†], HS Jo, MW Kim, MW LEE, AL Yarin, SS Yoon, Silver-decorated and palladium-coated copper-electroplated fibers derived from electrospun polymer nanofibers, *Chemical Engineering Journal* (IF=6.216), 327, 336-342, 2017.
 43. S An[†], BN Joshi[†], JG Lee[†], MW Lee, **YI Kim**, MW Kim, HS Jo, SS Yoon*, A comprehensive review on wettability, desalination, and purification of graphene at water interfaces, *Catalysis Today* (IF=4.312), 295, 14-25, 2017.
 44. S An, **YI Kim**[†], MW Lee, AL Yarin*, SS Yoon*, Wetting and coalescence of drops of self-healing agents on electrospun nanofiber mats, *Langmuir* (IF=3.833), 33(40), 10663-10672, 2017
 45. BN Joshi[†], S An[†], **YI Kim**, EP Samuel, KY Song, IW Seong, SS Al-Deyab, MT Swihart, WY Yoon*, SS Yoon*, Flexible freestanding Fe₂O₃-SnO_x-carbon nanofiber composites for Li ion battery anodes, *Journal of Alloys and Compounds* (IF=3.014), 700, 259-266, 2017.

46. EP Samuel[†], HS Jo[†], BN Joshi, S An, HG Park, **YI Kim**, WY Yoon*, SS Yoon*, Decoration of MnO nanocrystals on flexible freestanding carbon nanofibers for lithium ion battery anodes, *Electrochimica Acta* (IF=4.803), 231, 582-589, 2017.
47. S An[†], **YI Kim**[†], S Sinha-Ray[†], MW Kim, HS Jo, MT Swihart, AL Yarin*, SS Yoon*, Facile processes for producing robust, transparent, conductive platinum nanofiber mats, *Nanoscale* (IF=7.367), 9, 6076-6084, 2017.
48. S An, HS Jo, **YI Kim**, KY Song, MW Kim, KB Lee, AL Yarin*, SS Yoon*, Bio-inspired colorful, flexible, defrostable light-scattering hybrid films for effective distribution of LED light, *Nanoscale* (IF=7.760), 9, 9139-9147, 2017.

Conference Papers

1. **YI Kim**, High-efficient, Eco-friend, Flexible Silver/Core-Carbon/Shell Nanofiber Mats for Energy Storage, *4th International Conference on Energy and Environmental Science (ICEES)*, Perth, Australia, Jan. 8-10, 2020.
2. **YI Kim**, Wetting and coalescence of self-healing agent droplets on electrospun nanofiber mat, *14th International Conference on Liquid Atomization & Spray Systems (ICLASS)*, Chicago, USA, Jul. 22-26, 2018.
3. **YI Kim**, Cactus-Like Nickel-Silver Core-Shell Microfibers for Flexible Electronics, *The 4th UIC-KU Conference on Nano-Textured Composites*, Chicago, USA, Jul. 22, 2018.
4. **YI Kim**, Facile Processes for Producing Robust, Transparent, Conductive Platinum Nanofiber Mats, *The 3rd UIC-KU Conference on Nano-Textured Composites*, Chicago, USA, Apr. 20-30, 2017.
5. **YI Kim**, Antioxidant metal microfibers for use as transparent electrodes and heaters, *International Conference on Mechanical & Production Engineering (ICMPE)*, Tokyo, Japan, Nov. 4-6, 2017.
6. **YI Kim**, S An, HS Jo, SS Yoon*, Novel platinum nanofibers via electrospinning and electroplating techniques, *Global Photovoltaic Conference (GPVC)*, Gwangju, Republic of Korea, Mar. 15-17, 2017.
7. **YI Kim**, HG Park, HS Jo, S An*, Novel core-shell copper-silver microfibers based on electrospun polymer nanofibers, *International Conference on Mechanical Design and Engineering (ICMDE)*, Hong Kong, Jan. 20-22, 2017.

Patents (1 registered)

1. SG Yoon, S An, HS Jo, **YI Kim**, *Light-scattering plate for LED light and method of manufacturing the same*, 10-1908218 (2018. 10. 08).

SKILLS

- **Technique:** SEM (scanning electron microscopy), EDX (energy dispersive x-ray spectroscopy), TEM (transmission electron microscopy), AFM (atomic force microscopy), XRD (X-ray diffraction), XPS (X-ray photoelectron spectroscopy), FTIR (Fourier transform infrared spectroscopy), Raman spectroscopy, UV-VIS spectrometer, DSC (Differential scanning calorimetry), TGA (thermogravimetric analysis), 4-point probe

station, Optical surface profiler, Fluidic properties (viscosity, electrical conductivity, surface tension, dielectric constant)

- **Device fabrication:** electrospinning/electrospray device, electroplating device, contact angle measurement device
- **Design software program:** CATIA, Pro Engineering, AUTO CAD, SolidWorks, Imeasure

REFERENCE

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