

Doron Kam

Ph.D. | University of California, Irvine

@ doronkam@gmail.com
g [Doron Kam](#)
iD [0000-0002-5119-965X](https://orcid.org/0000-0002-5119-965X)

I am a physicist, experienced with experimental and analytical interdisciplinary research with strong statistical capabilities and hands-on sense. I have developed novel inks, instrumentation, and techniques for 3D printing with adequate measurements of physical properties. Looking for simple solutions to complex problems. I am curious and a team player, and I love my work.
















Education

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- 2022** **Ph.D.** in Plant Science & Chemistry - The Hebrew University of Jerusalem, Jerusalem, Israel.
Title: **Cellulose nanocrystals (CNC) for 2D and 3D printed structures**
- 2016** **M.Sc. (Cum laude)** in Plant Science - Robert H. Smith Faculty of Agriculture, Food and Environment, The Hebrew University of Jerusalem, Rehovot, Israel.
Title: **Understanding the role of cellulose nanocrystal surface charge on rheology and chirality**
- 2013** **B.Sc.** in Physics - Faculty of Science, The Hebrew University of Jerusalem, Jerusalem, Israel.


Experience

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- 2024- | Postdoctoral fellow - University of California, Irvine
Advisor: Prof. Alon Gorodetsky
➤ Genetic engineering of plants and plant-based materials.
- 2022-2024 | Postdoctoral fellow - The Hebrew University of Jerusalem
Advisor: Prof. Shlomo Magdassi
➤ Development of an innovative stereolithography-based 3D printing ink composition without a photoinitiator.
➤ Utilizing 3D printed scaffold to facilitate cell growth for tissue engineering by stereolithography 3D printing technology using ink composition containing only non-modified proteins.
- 2020- | Founding team member of the original IP of Daika Ltd. (Daikawood.com)
Wood-based Raw Materials for Manufacturing
➤ Implementing 100% printed wood research to applicative TRL 4.
➤ Funding stage - seed (3.4M\$, Jun. 2021).
➤ Academy-focused, currently uncommitted to Daika.
- 2016-2022 | Ph.D. - The Hebrew University of Jerusalem
Advisors: Prof. Oded Shoseyov & Prof. Shlomo Magdassi
➤ Printing Resilin protein complex structures with a sub-micron resolution using a two-photon printing process. Achieving highly elastic and resilient objects using nanoindentation dynamic mechanical analysis.
➤ Utilizing CNC as a rheological modifier and a novel water-compatible photoinitiator to facilitate DIW 3D printed hydrogels without compromising on printing time.
➤ Investigated plant cell wall material in the design and 3D printing of 100% wood-based objects leading to enhanced mechanical properties.
➤ Designed, built, and characterized the Direct Cryo Writing (DCW) 3D printing technique, which encompasses freeze-drying with 3D printing. DCW combines DIW 3D printing with freeze casting allowing the formation of low-concentration hydrogels to evolve into aerogels with aligned structures.
- 2016-2017 | Data scientist - GemmaCert (Gemmacer.com)
Non-destructive real-time identification, and quantification of the Cannabis active compounds
➤ Studied light-matter interaction of Cannabis flowers with numerous spectroscopy to reach non-invasive cannabinoid detection at an early-stage startup company.
➤ Leading the development of the first data model (supervised learning).
- 2014-2016 | M.Sc. - The Hebrew University of Jerusalem
Advisor: Prof. Oded Shoseyov
➤ Studied particle-particle interaction of cellulose nanocrystal in aqueous suspension.
➤ The role of surface charge on lyotropic liquid crystal phase separation.

Publications

16. A. Bunin, O. Harari-Steinberg, [D. Kam](#), T. Kuperman, M. Friedman-Gohas, B. Shalmon, L. Larush, S. Ithhak Duvdevani, S. Magdassi, **DLP printing of non-modified protein-only compositions**. *ChemRxiv*. (2024). - (preprint) 
15. [D. Kam](#),* R. Liebermana,* N. Trink, O. Rulf, S. Magdassi, **Vat photopolymerization printing by thermal polymerization utilizing carbon nanotubes as photothermal converters**. *Virtual Phys. Prototyp.* **19**(1), (2024). (*Equal contribution) 
14. [D. Kam](#), M. Yam Moshkovitz, O. Bliah, A. Kamyshny, S. Magdassi, **Additive manufacturing: from 2D to 4D printing**. *The Israel Chemist and Chemical Engineer*. - (in press)
13. [D. Kam](#),* O. Rulf,* A. Reisinger, R. Lieberman, S. Magdassi, **3D printing by stereolithography using thermal initiators**. *Nat. Commun.* **15**, 2285 (2024). (*Equal contribution) 
12. T. Naor, S. Gigi, N. Waiskopf, G. Jacobi, S. Shoshani, [D. Kam](#), S. Magdassi, E. Banin, U. Banin, **ZnO Quantum Photoinitiators as an All-in-One Solution for Multifunctional Photopolymer Nanocomposites**. *ACS Nano*, **17**(20), 20366–20375 (2023). 
11. I. Binyamin, E. Grossman, M. Gorodnitsky, [D. Kam](#), S. Magdassi, **3D Printing Thermally Stable High-Performance Polymers Based on a Dual Curing Mechanism**. *Adv. Funct. Mater.* 2214368 (2023). 
10. [D. Kam](#), A. Olender, A. Rudich, Y. Kan-Tor, A. Buxboim, O. Shoseyov, S. Magdassi, **3D Printing of Resilin in Water by Multiphoton Absorption Polymerization**. *Adv. Funct. Mater.* 2210993 (2023). ([Journal cover](#)) 
9. S. Roig-Sanchez, [D. Kam](#), N. Malandain, E. Sachyani-Keneth, O. Shoseyov, S. Magdassi, A. Laromaine, A. Roig, **One-step double network hydrogels of photocurable monomers and bacterial cellulose fibers**. *Carbohydr. Polym.* **294**, 119778 (2022). 
8. [D. Kam](#),* I. Levin,* Y. Kutner, O. Lanciano, E. Sharon, O. Shoseyov, S. Magdassi, **Wood Warping Composite by 3D Printing**. *Polymers*. **14**, 733 (2022). (*Equal contribution)
Press coverage (Went viral after ACS Fall 2022 presentation): [PHYS.ORG](#), [EurekAlert!](#), [ACS Newsroom](#), [NewScientist](#), [INVERSE](#), [plastic molding news](#), [SYFY](#), [Fabbaloo](#), [Daily Mail](#), [Tipblog](#), [NEW ATLAS](#), [Public News Time](#), [3D printing.com](#), [designboom](#), [3D Printing Industry](#), [CBSNEWS](#), [ABC News Today](#), [ed engineering-designer](#), [AZO materials](#), [StudyFinds](#), [tct magazine](#), [ZME SCIENCE](#), [The New York Daily Paper](#), [BLOG TECHO](#), [Woody House](#), [core77](#), [ars TECHNICA](#), [THE TIMES OF ISRAEL](#), [Chemistry World](#). 
7. [D. Kam](#), A. Braner, A. Abouzglo, L. Larush, A. Chiappone, O. Shoseyov, S. Magdassi, **3D Printing of Cellulose Nanocrystal-Loaded Hydrogels through Rapid Fixation by Photopolymerization**. *Langmuir*. **37**, 6451–6458 (2021). 
6. [D. Kam](#), M. Layani, S. BarkaiMinerbi, D. Orbaum, S. Abrahami BenHarush, O. Shoseyov, S. Magdassi, **Additive Manufacturing of 3D Structures Composed of Wood Materials**. *Adv. Mater. Technol.* **4**, 1900158 (2019). 
5. [D. Kam](#), M. Chasnitsky, C. Nowogrodski, I. Braslavsky, T. Abitbol, S. Magdassi, O. Shoseyov, **Direct Cryo Writing of Aerogels Via 3D Printing of Aligned Cellulose Nanocrystals Inspired by the Plant Cell Wall**. *Colloids and Interfaces*. **3**, 46 (2019). 
4. D. Morantes, E. Muñoz, [D. Kam](#), O. Shoseyov, **Highly charged cellulose nanocrystals applied as a water treatment flocculant**. *Nanomaterials*. **9**, 1–13 (2019). 
3. T. Abitbol,* [D. Kam](#),* Y. Levi-Kalishman, D. G. Gray, O. Shoseyov, **Surface Charge Influence on the Phase Separation and Viscosity of Cellulose Nanocrystals**. *Langmuir*. **34**, 3925–3933 (2018). (*Equal contribution) 
2. Y. Calahorra, A. Datta, J. Famelton, [D. Kam](#), O. Shoseyov, S. Kar-Narayan, **Nanoscale electromechanical properties of template-assisted hierarchical self-assembled cellulose nanofibers**. *Nanoscale*. **10**, 16812–16821 (2018). 
1. E. Abraham, [D. Kam](#), Y. Nevo, R. Slattegard, A. Rivkin, S. Lapidot, O. Shoseyov, **Highly Modified Cellulose Nanocrystals and Formation of Epoxy-Nanocrystalline Cellulose (CNC) Nanocomposites**. *ACS Appl. Mater. Interfaces*. **8**, 28086–28095 (2016). 


Book Chapters

1. O. Shoseyov, [D. Kam](#), T. Ben Shalom, Z. Shtein, S. Vinkler, Y. Posen, **Nanocellulose Composite Biomaterials in Industry and Medicine**. In: *Extracellular Sugar-Based Biopolymers Matrices. Biologically-Inspired Systems*, E. Cohen, H. Merzendorfer, Eds. (Springer International Publishing, Cham, 2019), pp. 693–784. 






Patents

1. **D. Kam, M. Layani, O. Shoseyov, S. Magdassi. Wood paste and objects made therefrom.**
US20200369888A1

Other Activities

2. **3D printing spent coffee ground.** Y. Kutner, **D. Kam.**
1st place at the 2020 Creativity Challenge of the Center for Innovation and Entrepreneurship. 
1. **FilteRisk, emergency water purification using Ag NPs synthesized directly onto a solid fiber.**
G. Goldstein, T. Abitbol, **D. Kam.**
2nd place at Joint-Forces, a joint Hebrew University-Bezael Arts & Science competition.

Mentorship & Teaching

- 2019-2021  **Teaching** - The Faculty of Agriculture, 'physics (A) (extended)' (71031; B.Sc 1st year).
- 2018-2020  **Advisor/Supervisor high school student project**, Yinon Kutner, Alpha research program in the sciences.
Title: **3D printed wood warping.**
- 2018-2021  **Teaching** - The Faculty of Agriculture, 'physics (B) (extended)' (71032; B.Sc 1st year).
- 2017-2019  **Advisor/Supervisor high school student project**, Ariel Braner, Alpha research program in the sciences. Winning an honorable mention ([XLAB](#) 3 week science camp), [The Israel Young Scientists and Developers Contest 2019](#)
Title: **3D printed UV curable hydrogel using cellulose nanocrystal as a rheological modifier.**
- 2016-2017  **Teaching** - The Unit for Equal Opportunities, 'physics' (71031 & 71032; B.Sc 1st year).

Skills

Material characterization	Mechanical - Experimenting and analyzing data of quasistatic & dynamic mechanical properties. Highly skilled with atomic force microscopy, nanoindentation, Instron, rheometer. Spectroscopy - Experienced in scanning electron microscopy, light microscopy, IR/NIR/UV spectroscopy. Other types of characterization - Dynamic light scattering, zeta potential, contact angle.
3D printing	Developing and tailoring printing methods. From CAD design (Autodesk Inventor, Solidworks) and hands-on in vat polymerization (DLP, SLA), two-photons printing, extrusion-based (FDM, DIW), inkjet, binder-jet 3D printing technologies.
Chemistry	Adjusting ink formulation for specific requirements such as surface tension, viscosity, evaporation rate, etc. Photopolymerizable ink development with broad knowledge of monomers/oligomers, photo-initiators, dyes, and inhibitors (specialty in water-based inks). Colloids - dispersion and nanoparticles: synthesis, stabilization, wetting, coupling agents, and analysis.
Programming	Python, Matlab.

Oral Presentations

8. **Wood warping by 3D printing**, 5th EPNOE Junior Scientist Meeting 2022 (Aveiro, Portugal) Sep. 2022
7. **Wood warping by 3D printing**, ACS Fall 2022 (Chicago, Illinois, USA) Aug. 2022
6. **3D Printed Resilin**, Nano Center Annual conference (Dead sea, Israel) Mar. 2022
5. **3D printed wood**, Annual Student Conference of the Faculty of Agriculture Food and Environment (Rehovot, Israel) Feb. 2022
4. **Additive Manufacturing of 3D Wooden Structures**, IMEC 2021 (Jerusalem, Israel) Dec. 2021
3. **3D printed wood**, ACS Spring 2019 (Orlando, Florida, USA) Apr. 2019
2. **Direct cryo writing of aerogels inspired by the plant cell wall by 3D printing of aligned cellulose nanocrystals**, ACS Spring 2019 (Orlando, Florida, USA) Apr. 2019
1. **Direct Cryo Writing (DCW) 3D Printed Cellulose nanocrystals - Xyloglucan Foams**, Nano Center Annual conference (Dead sea, Israel) Jul. 2017

📄 Poster presentations

9. **3D objects composed of 100% proteins by two-photons printing**, Biomaterials: From Basic Science of Nature's Material Design to the Biotech Industry (Rehovot, Israel) Jun. 2023 (Best poster award)
8. **3D objects composed of 100% proteins by two-photons printing (TPP)**, ICAM2023 (Ramat Gan, Israel) Mar. 2023
7. **Elimination of the height limit for extrusion-based 3D printed hydrogels by rapid photopolymerization**, 5th EPNOE Junior Scientist Meeting 2022 (Aveiro, Portugal) Sep. 2022
6. **TPO nanoparticle as water-soluble photoinitiator and CNC as a rheological modifier for extrusion-based 3D printing technique**, ACS Fall 2022 (Chicago, Illinois, USA) Aug. 2022 (CELL division selection for Sci-Mix)
5. **Extrusion-based 3D printing of hydrogels with TPO water-soluble photoinitiator and cellulose nanocrystals as a rheological modifier**, NanoIL 2021 (Jerusalem, Israel) Oct. 2021
4. **Additive manufacturing of wood**, ACS Spring 2019 (Orlando, Florida, USA) Apr. 2019 (CELL division selection for Sci-Mix)
3. **Plant cell wall bioinspired Direct Cryo Writing 3D printing**, NanoIL 2018 (Jerusalem, Israel) Oct. 2018
2. **Cellulose nanocrystals for 3D printed objects**, Materials 4.0 (Dresden, Germany) Sep. 2017 (Best poster award)
1. **Understanding the role of cellulose nanocrystal (CNC) surface charge on rheology and chirality**, Nano Center Annual conference (Kibbutz Hagoshrim, Israel) Apr. 2016

📄 References

Prof. **Oded Shoseyov**, HUJI, Plant Molecular Biology & Nano Biotechnology

shoseyov@agri.huji.ac.il

Prof. **Shlomo Magdassi**, HUJI, Chemistry

magdassi@mail.huji.ac.il

Prof. **Tiffany Abitbol**, EPFL, School of Engineering

tiffany.abitbol@epfl.ch

Prof. **Amnon Buxboim**, HUJI, Life Sciences

amnon.buxboim@mail.huji.ac.il