

PUBLICATION LIST

XU HAN, Ph.D.

INTERNATIOANAL PATENT APPLICATIONS:

Han X, Koulen P, Crister J. 2019. An Efficient Cryopreservation Device Preventing the Direct Contact Between Samples and Extracellular Ice, PCT/US2019/048986, published as WO2020047369A2. **The USPTO written opinion is that all claims associated with the device are novel, involve inventive step, and industrially applicable.** The PCT was nationalized in USA, EU, Japan, China, and India to cover the global corneal transplantation market in 2021.

Han X, White H, Koulen P. 2019. Improved Ultra-Fast Cooling System and Methods of Use, PCT/US2019/26162, published as WO2019195791A1. **The USPTO written opinion was that all claims are novel, involve inventive step, and industrially applicable.** The PCT was nationalized in USA, EU, Japan, China and India in 2020 to cover the global artificial tissue market.

Han X, White H, Koulen P. 2021. Efficient Cryopreservation Medium that Eliminates Need for Inclusion of a Cell Permeating Cryoprotectant and Methods of Use. USA 63/170,673. PCT filing pending. This is the first-in-class biocompatible cryopreservation technology for cells and tissues without the need for any cell permeating cryoprotectant or liquid nitrogen facilities.

Han X, Yuan Y, and Roberts R.M. 2017. Cryopreservation Medium and Method to Prevent Recrystallization, PCT/US2017/032606, published as WO 2017/197379 A1. It is being nationalized in USA, covering 30% of the global biobanking market. This gives the birth to the only cryopreservation medium product in the market that doesn't require liquid nitrogen facilities for long-term storage of cells and tissues. It also reduces the use of cell permeating cryoprotectant for most cell and tissue types.

MANUSCRIPTS PUBLISHED IN PEER-REVIEWED JOURNALS:

As the corresponding author:

Mao Y, **Han X**, Zhang Y, (2018). Cryoprotective Mechanism of Using Ficoll for Cell Cryopreservation at Non-Cryogenic Temperatures: A Molecular Dynamics Study. Int. J. of Heat and Mass Transfer. 127: 319-325.

Yuan Y, Yang Y, Tian Y, Park J, Dai A, Roberts RM, Liu Y, **Han X** (2016). Efficient long-term cryopreservation of pluripotent stem cells at -80 °C. Nature. Scientific Reports. 6:34476.

Han X (2016). Direct microscale measurement of mouse oocyte membrane permeability to water and ethylene glycol at subzero temperatures using cryomicroscopy. Cryo Letters. 2016; 37(6):394-400. (as an invited author for the special issue: micro- and nano-technology in low temperature biology)

Han X (2016). A Theoretical and Experimental Investigation of Mechanical Damage to Rodent Sperm Generated by Microscale Ice Formation. Cryo Letters. 2016; 37(6):388-393. (as an invited author for the

special issue: micro- and nano-technology in low temperature biology)

As first or co-author:

Su F, Ma H.B, **Han X**, Chen H, Tian B (2012) Ultra-high cooling rate utilizing thin film evaporation. *Applied Physics Letters*, DOI: 10.1063/1.4752253.

Wu Y.F, **Han X**, Benson J. Almasri M (2012) Micromachined Coulter counter for dynamic impedance study of time sensitive cells. *Biomedical Microdevices* 14:739-750.

Han X, Liu Y, Critser J. K, (2010) Determination of the quaternary phase diagram of the water–ethylene glycol–sucrose–NaCl system and a comparison between two theoretical methods for synthetic phase diagrams. *Cryobiology* 61: 52-57.

Benson J. D, Bagchi A, **Han X**, Critser J. K, Erik J. W (2010) Melting point equations for the ternary system water/sodium chloride/ethylene glycol revisited. *Cryobiology* 61: 352–356.

Han X, Critser J. K, (2009) Measurement of the size of intracellular ice crystals in mouse oocytes using a melting point depression method and the influence of intracellular solute concentrations. *Cryobiology* 59: 302-307.

Han X, Benson J. D, Critser J. K (2009) Measurement of the apparent diffusivity of ethylene glycol in mouse ovaries through rapid MRI and theoretical investigation of cryoprotectant perfusion procedures. *Cryobiology* 58: 298-302.

Han X, Ma H.B, Wilson C, Critser J.K (2008) Effects of nanoparticles on the nucleation and devitrification temperatures of cryoprotectant solutions. *Microfluidics and Nanofluidics* 4: 357-361.

Han X, Ma H.B, Jiao A, Critser J. K (2008) Investigations on the heat transport capability of a cryogenic oscillating heat pipe and its application in achieving ultra-fast cooling rates for cell vitrification cryopreservation. *Cryobiology* 56: 195-203.

Han X, Luo D, Cui X, Heimfeld S, Gao D (2007) A modified differential scanning calorimetry method for determining water transport properties in biological cells during the freezing process. *Cell Preservation Technology*. 5: 182-189.

Jiao A, **Han X**, Critser J. K, Ma H.B (2006) Numerical investigations of transient heat transfer characteristics and vitrification tendencies in ultra-fast cell freezing processes, *Cryobiology* 52: 386-392.

Han X, Gao D, Luo D, Yu C, Lu C. C (2005) Numerical simulation of the microwave rewarming process of cryopreserved organs. *Microwave and optical technology letters* 5: 201-205.

Luo D, **Han X**, Gao D (2002) A modified differential scanning calorimetry for determination of cell volumetric change during the freezing process. *Cryoletters* 23: 229-236.

SELECTED CONFERENCE PRESENTATIONS & PROCEEDING PUBLICATIONS:

Han X., Biocompatible Cryopreservation of Blood, Corneas and Skin Grafts, European Society of Medicine (ESMED) Congress, 2021 (transferred to 2022 due to the conflict with a NIH study section)

Han X., Quillo A., Disruptive Cryopreservation Technology Platform. NIH Innovation Conference, 2020, Virtual

Quillo A., **Han X.**, Disruptive Cryopreservation Technology Platform. Life Sciences Summit, 2020, New York, NY, Virtual

Obeiter S., Wiedmeyer C. E., **Han X.**, Cytologic Evaluation of Diagnostic Fluids Frozen with Cryopreservation Media, Annual Meeting of the American College of Veterinary Pathologists, 2020, Virtual

Efficient Cryopreservation of Primary Chromaffin Cells Using A Novel Cryopreservation Medium. Hammond D., **Han X.**, and Gillis K. Annual Meeting of the Biophysical Society, Feb. 15-19th, 2020, San Diego, California

Efficient Serum-free Cryopreservation of Insect Cell Lines at -20°C and -80°C. Goodman C., **Han X.**, Huang Y., Dubos K., Ringbauer J., Augustin M., and Stanley D. In Vitro Biology Meeting, June 8-12th, 2019, Tempa, Florida

Khoukaz H.B., **Han X.**, Ji Y., Hill M.A., and Fay W.P., A novel approach for storage of vascular cells at -20°C using a cryopreservation medium that minimizes ice recrystallization, Vascular Research Initiatives Conference, May 14-16th, 2019, Boston, Massachusetts

Gooch S.A., Shoemake C. R., Wiedmeyer C. E., **Han X.**, Cryopreservation of body cavity fluids for diagnostic cytology, National Veterinary Scholars Symposium August 2–4th, 2018, College Station, TX

Han X., Life in Nano Ice: Application of CryoCrate C80EZ Medium for Cell and Tissue Cryopreservation, Biobanking 2017, Aug. 13-15th, 2017, Santiago CA (as an invited speaker)

Han X., Yuan Y, Roberts R M, Challenges facing the 21st century cryopreservation technology and our current and potential solutions with micro/nano technology, 7th World Congress of Biomechanics, July 6-11th, 2014, Boston, Massachusetts. (Also as invited Podium Speaker)

Yuan Y, Tian Y, Roberts R M, **Han X.**, Efficient long-term cryopreservation of porcine pluripotent stem cells at -80°C, Society for the Study of Reproduction 47th Annual Meeting Fertility: A Global Challenge, July 19–23th, 2014, Grand Rapids, Michigan.

Han X., Liu Y, Determination of the Compositions of Intracellular Lipid Droplets in Porcine Oocytes and Investigation of the Mechanisms of Their Thermal Mechanical Damages During Cryopreservation. Presented in the 48th Annual Meeting of the Society for Cryobiology, July 24-27th, 2011, Corvallis, Oregon.

Han X., Ma, H B, Liu Y, Development of An Inexpensive Method for Long-term Storage of Mouse Embryos at -80 °C, Presented in the 48th Annual Meeting of the Society for Cryobiology, July 24-27th, 2011, Corvallis, Oregon.

Han X, Ma H, Critser J.K, A Simple Cryomicroscopic Method to Measure the Size of Intracellular Ice Crystals, ASME 2009 Second International Conference on Micro/Nanoscale Heat and Mass Transfer, Volume 3, pp. 489-493.

Han X, Liu Y, Benson J.D, Ma H, Critser J.K, Measurement of Water-cryoprotectant Mutual Diffusivity in Micro-scale Biological Tissues at Subzero Temperatures, ASME 2009 Second International Conference on Micro/Nanoscale Heat and Mass Transfer, Volume 3, pp. 495-499.

Han X, Mullen S.F, Critser J.K, Development of an Intracellular Phase Diagram and its Applications. Presented in the 44th Annual Meeting of the Society for Cryobiology, July 28- August 1st, 2007, Lake Louise, Canada

Han X, Ma H. B, Wilson C, Critser J. K, Effects of Nanoparticles on the Nucleation and Devitrification Temperatures of Polyol Cryoprotectant Solutions. Presented in the 44th Annual Meeting of the Society for Cryobiology, July 28- August 1st, 2007, Lake Louise, Canada

Han X, Mullen S.F, Critser J.K, A Novel Measurement of Cryoprotectant Permeability at Subzero Temperatures. Presented in the 44th Annual Meeting of the Society for Cryobiology, July 28- August 1st, 2007, Lake Louise, Canada

Han X, Gao D, Mechanism of intercellular ice propagation in plant tissues: experiments and theoretic analysis, Presented in the 42nd Annual Meeting of the Society for Cryobiology, July 24-27th, 2005, Minneapolis, MN.

Han X, Luo D, Lu C.C, Gao D, Optimization of microwave rewarming of cryopreserved materials: Experiments and numerical simulation. Presented in the 42nd Meeting of the Society for Cryobiology, July 24-27th, 2005, Minneapolis, MN.

Han X, Luo D, Lu C.C, Gao D, Numerical simulation of the microwave heating of cryopreserved organs. Presented in the 41st Meeting of the Society for Cryobiology, July 15-19th, 2004, Beijing, P.R.China

Han X, Luo D, Gao D, A novel model of the pattern of intracellular ice formation in tissue. Presented in the 41st Meeting of the Society for Cryobiology, July 15-19th, 2004, Beijing, P.R.China

Han X, Luo D, Chen Z, Gao D, Development of a hot-wire sensor using photolithography: thermal conductivity measurements of biological materials and solutions, Presented in the 39th Meeting of the Society for Cryobiology, July 28-31th, 2002, Breckenridge, CO