Chii Jou Chan, Ph.D.

Principle Investigator, Mechanobiology Institute,
Asst. Prof. Department of Biological Sciences,
National University of Singapore (Jan. 2021)

EMBL Heidelberg, Heidelberg, Germany
cchan@embl.de
+49 62213878723 (Office)
+49 1722407095 (Cell)
@ChiiJChan1

RESEARCH INTERESTS

I am a biophysicist with a passion to understand the mechanobiology and tissue hydraulics of early mammalian development. We combine advanced quantitative imaging, biophysical tools and developmental genetics to measure and manipulate tissue mechanics and signaling, in order to understand the mechanochemical feedback interactions underlying robust tissue morphogenesis and patterning during oogenesis and embryogenesis.

EDUCATION

Ph.D.	*Non-canonical aspects in cell and nuclear mechanics* University of Cambridge, UK. Supervisor: Prof. Jochen Guck	10/2011 – 07/2015
M.Phil.	*Non-equilibrium statistical mechanics of nematic liquids* University of Cambridge, UK. Supervisor: Prof. Eugene Terentjev	10/2002 – 08/2003
M.Sc. **B.A.**	*Experimental and Theoretical Physics* University of Cambridge, UK. First Class with Honors in both degrees	10/1998 – 07/2002

RESEARCH EXPERIENCE

Postdoctoral Researcher – Dr. Robert Prevedel, EMBL Heidelberg, Heidelberg, Germany	06/2020 – 12/2020
Postdoctoral Researcher – Dr. Takashi Hiiragi, EMBL Heidelberg, Heidelberg, Germany	01/2016 – 05/2020
Bridging Postdoc – Prof. Jochen Guck, Biotechnology Center, Dresden, Germany	04/2015 – 12/2015
Graduate Researcher (Ph.D.) – Prof. Jochen Guck, Cavendish Laboratory Biological and Soft Systems group, Cavendish Laboratory, University of Cambridge, UK	10/2011 – 03/2015
Graduate Researcher (theoretical modelling of polyelectrolyte brush) – Prof. Philip Pincus Department of Physics, University of California, Santa Barbara, USA	10/2003 – 09/2005
Graduate Researcher (M.Phil.) – Prof. Eugene Terentjev Biological and Soft Systems group, Cavendish Laboratory, University of Cambridge, UK	10/2002 – 08/2003

GRANTS AND AWARDS

Singaporean Teaching and Academic Research Talent (START) Inauguration Grant	Jan 2021
Society for Developmental Biology Annual Meeting International Travel Award	July 2019
Marie Curie Individual Fellowship (declined)	Jan 2017
EMBL Interdisciplinary Postdoctoral (EIPOD) Fellowship	2017 – 2019
Marie Curie ITN ESR Fellowship (Ph.D.) – TRANSPOL (Grant number 264399)	2011 – 2014
Cambridge Commonwealth Trust Scholarship (Honorary)	2011 – 2014

PUBLICATIONS

* denotes equal first author. † denotes corresponding author.

Research Articles

1. Yang Q, Xue S-L, **Chan CJ**, Rempfler M, Vischi D, Gutierrez F M, Hiiragi T, Hannezo E, Liberali. Cell fate coordinates mechano-osmotic forces in intestinal crypt morphogenesis. *bioRxiv* (2020).

2. Ryan AQ, **Chan CJ**, Graner F, Hiiragi T. Lumen expansion facilitates epiblast-primitive endoderm fate specification during mouse blastocyst formation. ***Developmental Cell*** (2019) 51, 1-14.

3. **Chan CJ**†, Costanzo M, Ruiz-Herrero T, Mönke G, Petrie R, Bergert M, Diz-Munoz A, Mahadevan L†, Hiiragi T†. Hydraulic control of mammalian embryo size and cell fate. ***Nature*** (2019) 571:112-116.
- **Highlighted in News & Comments** *Embryonic hydraulics. Nat. Rev. Mol. Cell Bio.* (2019) 20:454.

4. **Chan CJ**†, Li W, Cojoc G, Guck J†, Volume transitions of isolated cell nuclei induced by rapid temperature increase. ***Biophysical Journal*** (2017) 112(6):1063-1076.

5. Schürmann M, Scholze J, Müller P, Guck J, **Chan CJ**. Cell nuclei have lower refractive index and mass density than cytoplasm. ***Journal of Biophotonics*** (2016) 9(10): 1068-1076.

6. **Chan CJ***, Ekpenyong AE*, Golfier S, Li W, Chalut KJ, Otto O, Elgeti J, Guck J, Lautenschläger F. Myosin II activity softens cells in suspension. ***Biophysical Journal*** (2015) 108(8): 1856–1869.

7. **Chan CJ**, Whyte G, Boyde L, Salbreux G, Guck J. Impact of heating on passive and active biomechanics of suspended cells. ***Interface Focus*** (2014) 4, 20130069.

8. Chalut KJ, Höpfler M, Lautenschläger F, Boyde L, **Chan CJ**, Ekpenyong AE, Martinez-Arias A, Guck J. Chromatin decondensation and nuclear softening accompany Nanog downregulation in embryonic stem cells. ***Biophysical Journal*** (2012) 103(10): 2060-2070.

9. **Chan CJ**, Terentjev EM. Non-equilibrium statistical mechanics of liquid crystals: relaxation, viscosity and elasticity. ***Journal of Physics A*** (2007) 40 R103-R148 Topic Review.

Reviews/Technical Reports

1. Roffay C*, **Chan CJ***, Guirao B, Hiiragi T, Graner F. Inferring cell junction tension and pressure from cell geometry. ***Development***, ***under review.***

2. **Chan CJ**†, Hiiragi T. Integration of luminal pressure and signalling in tissue self-organisation. ***Development*** (2020) 147, 1-10

3. **Chan CJ**†, Heisenberg C-P, Hiiragi T. Coordination of morphogenesis and cell fate specification in development. ***Current Biology***. (2017) 27(18):R1024-R1035.

4. **Chan CJ**†, Hiiragi T. Keeping in touch to differentiate. ***Developmental Cell*** (2017) 43(2):113-114

Book Chapters/Conference Proceedings

1. Schürmann M, Scholze J, Müller P, **Chan CJ**, Ekpenyong AE, Chalut KJ, Guck J. Refractive index measurements of single, spherical cells using digital holographic microscopy. ***Methods in Cell Biology*** (2015) 125:143-159.

2. Müller P, Schürmann M, **Chan CJ**, Guck J. Single-cell diffraction tomography with optofluidic rotation about a tilted axis, *Proc. SPIE 9548, Optical Trapping and Optical Micromanipulation XII* (2015).

3. **Chan CJ**, Li W, Scholze J, Schürmann M, Guck J. Unique Mechanical Properties of Cell Nuclei Regulated by Chromatin, *Biophysical Society Annual Meeting* (2015) 108(2): 540a.

4. **Chan CJ**, Terentjev EM. Non-equilibrium statistical mechanics of nematic liquids. *IMA Volumes in Mathematics and Its Applications, Modeling of Soft Matter* (2005) 141:27-84.

SELECTED INVITED/CONFERENCE PRESENTATIONS

Aug 2021 Invited speaker, Society for the Study of Reproduction Annual Meeting, St. Louis, Missouri, USA

Dec 2019 Invited speaker, Grad. School of Med., Kyoto University, Kyoto, Japan.

Oct 2019 Conference speaker, Self-organisation in multicellular systems, Cargese, France

Jul 2019 Conference speaker, Society for Developmental Biology, Annual Meeting, Boston, USA

Nov 2018 Invited speaker, CRG, Barcelona, Spain.

Sep 2018 Conference speaker, EMBO Workshop on Size and Shape, Bangalore, India

May 2018 Invited speaker, Workshop 'Tissue Mechanics and Genetics', Université Paris Diderot, France

Mar 2018 Invited speaker, EMBO/EMBL symposium 'Tissue Self-organisation', EMBL Heidelberg, Germany

TEACHING AND MENTORING

EMBL Lautenschläger Summer School (lecture: physics of early embryo morphogenesis) 2019

PhD/Master/Intern supervision, EMBL Heidelberg 2017-2020
2x PhD students, 1x Master, 1x Intern

Master students supervision, Biotechnology Center, TU Dresden 2013-2015
5x Master students in total

Lab practicum supervision (Master), Biotechnology Center, TU Dresden 2013-2015
Designed and supervised optical stretcher experiments

Undergraduate supervision, University of Cambridge 2012
Supervised Part II students on soft condensed matter course

REVIEWER ACTIVITY

Grants: French National Research Agency (ANR), UK Medical Research Council.
Publications: *Nature Reviews Physics*, *PNAS*, *Dev. Cell*, *European Physical Journal E, Biophysical Journal, Cell Division*.

PUBLIC OUTREACH

1. Blog to the **Node** – *Embryonic hydraulics triumphs* 2019
   (http://thenode.biologists.com/embryonic-hydraulics-triumphs/research/)
2. Article contribution to **Euraxess Links ASEAN Newsletter** 2014
   (http://ec.europa.eu/euraxess/data/newsletters/asean/ASEAN_Newsletter_14Feb.pdf).