Curriculum vitae

CHNG, SHU SIN

Associate Professor
Vice Dean (Student Life and Alumni Relations), Faculty of Science
National University of Singapore,
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PROFESSIONAL EXPERIENCE

Jul 2021 – present	**Vice Dean (Student Life and Alumni Relations)** National University of Singapore Faculty of Science
Jul 2018 – present	**Associate Professor** National University of Singapore (Chemistry) **Visiting Associate Professor** Singapore Center for Environmental Life Sciences Engineering (SCELSE)
Jul 2020 – Jun 2021	**Deputy Head (Administration and Student Life)** National University of Singapore (Chemistry) **Assistant Dean (Special Duties)** National University of Singapore Faculty of Science
Jul 2018 – Jun 2020	**Assistant Head (Research and Education)** National University of Singapore (Chemistry)
Apr 2012 – Jun 2018	**Visiting Assistant Professor** Singapore Center for Environmental Life Sciences Engineering (SCELSE)
Aug 2011 – Jun 2018	**Assistant Professor** National University of Singapore (Chemistry)
Jul 2010 – Jul 2011	**Postdoctoral Fellow** Harvard Medical School (Microbiology and Molecular Genetics) (Advisor: Professor Jonathan Beckwith)
Jul 2000 – Jun 2004	**Research Assistant** National University of Singapore (Chemistry) (Advisor: Professor Teck Peng Loh)

EDUCATION

Sept 2004 – May 2010	**Doctor of Philosophy (Ph.D.) degree in Chemistry** Harvard University (Advisor: Professor Daniel Kahne)
Jul 2000 – Jun 2003	**Bachelor of Science (First Class Honors) degree in Chemistry** National University of Singapore (Advisor: Professor Teck Peng Loh)

MILITARY EXPERIENCE

Jan 1999 – May 2000	Battalion Signal Officer (40th Singapore Armoured Regiment)
Jan 1998 – Jan 1999	Officer Cadet (Signals – awarded Sword of Honour *for best cadet*)

TEACHING EXPERIENCE

Aug 2021 – present	**CM1102 – The Central Science** (NUS) Co-lecturer for AY21/22
Jan 2014 – May 2021	**CM3225 – Biomolecules** (NUS) Lecturer for AY13/14, 14/15, 15/16, 16/17, 17/18, 18/19, 19/20 and 20/21
Jan 2013 – Dec 2017	**CM4227 – Chemical Biology** (NUS) Lecturer for AY12/13, 13/14, 14/15, 15/16 and 17/18
Feb 2007 – Jun 2009	**Chemistry 270 – Chemical Biology** (Harvard University) Graduate Head Teaching Fellow for Spring 2009 Graduate Teaching Fellow for Spring 2007
Sept 2005 – Dec 2009	**Life Sciences 1A – An Integrated Introduction to the Life Sciences** (Harvard University) Course Assistant for Summer/Fall 2007 and Fall 2009 Graduate Teaching Fellow for Fall 2005, 2006 and 2007
Feb 2005 – Jun 2006	**Chemistry 27 – Organic Chemistry of Life** (Harvard University) Graduate Head Teaching Fellow for Spring 2006 Graduate Teaching Fellow for Spring 2005
Jan 2003 – May 2003	**CM 1121 – Basic Organic Chemistry** (NUS) Undergraduate Laboratory Teaching Assistant
Jan 2003 – May 2003	**Special Program in Science** (NUS) Student Mentor

AWARDS/FELLOWSHIPS/RECOGNITIONS

2020	NUS Annual Excellence Teaching Award Honour Roll 2018/2019
2019	2019 ASBMB Walter A. Shaw Young Investigator Award in Lipid Research
2019	NUS Annual Excellence Teaching Award 2017/18
2019	Featured in "Future of Biochemistry: The International Issue" in *Biochemistry* (Jan 2019)
2018	NUS Faculty of Science Young Scientist Award 2018
2017	NUS Faculty Honour Roll 2016/2017
2015 – 2016	NUS Annual Excellence Teaching Award 2013/14 and 2014/15
2014 – 2016	NUS Faculty Excellence Teaching Award 2013/14, 2014/15 and 2015/16
2014	Shortlisted for Singapore National Academy of Science (SNAS) Young Scientist Award 2014
2009	Christensen Prize *for outstanding research achievement*
2005/6/7/9	Harvard University Certificate of Distinction in Teaching (four terms)
2005 – 2006	Eli Lilly Organic Chemistry Fellowship Award
2003	Singapore National Institute of Chemistry (SNIC) Gold Medal

2002 – 2003	Agency for Science, Technology and Research (A*STAR) Pre-graduate Award
2002	Glaxo Gold Medal
2002	Merck Sharpe and Dohme (MSD) Gold Medal
2001	Singapore National Institute of Chemistry (SNIC) Book Prize
2000 – 2002	National University of Singapore Undergraduate Scholarship
1997	29th International Chemistry Olympiad (Silver medal)

GRANTS AND FUNDING

Nov 2021	MOE AcRF Tier 2 (T2EP30220-0041: S$936,880 3 years)
Feb 2020	NRF-ISF joint grant (NRF2019-NRF-ISF003-3285: S$355,000, 3 years)
Nov 2019	MOE AcRF Tier 2 (MOE2019-T2-1-128: S$997,400, 3 years)
Mar 2019	NMRC OF-IRG (MOH-000145: S$1,283,250, 4 years)
Dec 2018	MOE AcRF Tier 1 (S$135,000.00, 2 years)
Oct 2017	MOE AcRF Tier 1 (Collaborative scheme: S$84,200, 1.5 years)
Jan 2017	MOE AcRF Tier 2 (MOE2016-T2-1-104: S$937,972.50, 3 years)
Feb 2015	NMRC CBRG (NMRC/CBRG/0072/2014: S$1,200,000, 3 years)
Oct 2014	MOE AcRF Tier 2 (MOE2014-T2-1-042: S$891,236, 3 years)
Oct 2013	MOE AcRF Tier 2 (MOE2013-T2-1-148: S$885,944.50, 3 years)
Feb 2013	MOE AcRF Tier 1 (S$175,500, 3 years)
Aug 2011	NUS Start-up funding (S$760,000, 3 years)

INSTITUTION AND CONFERENCE TALKS

Jul 2023	Molecular and Cellular Biology of Lipids Gordon Research Conference, New Hampshire, USA
May 2021	Warwick Medical School, University of Warwick, Virtual
Sep 2020	British Biophysical Society - Bacterial cell envelopes satellite meeting, Virtual
Jan 2020	Department of Chemistry, Shizuoka University, Japan
Aug 2019	Inaugural Singaporean Researcher Global Summit, NUS, Singapore
Jul 2019	EMBO|EMBL Symposium on New Approaches and Concepts in Microbiology, Heidelberg, Germany
Jul 2019	Collaborative Research Center (SFB1279), Ulm University, Ulm, Germany
Jul 2019	Max Planck Institute of Polymer Research, Mainz, Germany
May 2019	NUS-Nagasaki Joint Symposium on Infection and Immunity (keynote speaker)
Apr 2019	Department of Microbiology, University of Pennsylvania, USA
Apr 2019	Department of Biochemistry, Duke University, USA
Apr 2019	Walter A. Shaw Young Investigator Award Lecture, ASBMB Annual Meeting 2019, Orlando, Florida
Nov 2018	Department of Chemistry, National Taiwan University, Taipei, Taiwan
Nov 2018	Institute of Biological Chemistry, Academia Sinica, Taipei, Taiwan
Jun 2018	Bacterial Cell Surfaces Gordon Research Conference, Vermont, USA
Jun 2018	Department of Chemistry and Chemical Biology, Cornell University, USA
May 2018	Institute of Pharmacology and Structural Biology, CNRS, Toulouse, France
May 2018	Institute of Microbiology of the Mediterranean, CNRS, Marseille, France
May 2018	Institute de Recherche en Infectiologie Montpellier, CNRS, Montpellier, France
Feb 2018	Division of Biomedical Science and Biochemistry, Australian National University, Australia
Feb 2018	The Peter Doherty Institute, University of Melbourne, Australia
Sep 2017	14th Molecular Analysis of Bacterial Pathogens Meeting, Adelaide, Australia
Jul 2017	International Union of Microbiology Societies 2017 (workshop chair)
May 2017	Department of Microbiology and Immunology, UCSF, USA

May 2017 Division of Biological Sciences, UC San Diego, USA
May 2017 Microbial Genetics and Genomics VII, Asilomar, California, USA
Apr 2017 MRC Center for Molecular Bacteriology and Infection, Imperial College London, UK
Apr 2017 Department of Biochemistry, University of Cambridge, UK
Apr 2017 Institute of Microbiology and Infection, Birmingham University, UK
Mar 2017 Center for Bacterial Cell Biology, Newcastle University, UK
Mar 2017 Department of Biochemistry, University of Oxford, UK
Mar 2017 Department of Microbiology, NUS, Singapore
Feb 2017 i3 Institute, University Technology of Sydney, Sydney, Australia
Feb 2017 Department of Microbiology, Monash University, Melbourne, Australia
Feb 2017 42nd Lorne Conference on Protein Structure and Function, Lorne, Australia
Jan 2017 4th International Conference on Cellular and Molecular Bioengineering, Singapore
Nov 2016 SPRINT-TB 2nd Annual Symposium 2016, Singapore
Oct 2016 Department of Biochemistry, NUS, Singapore
Sept 2016 EMBO Tuberculosis 2016, Paris, France
Sept 2016 Department of Microbiology, Pasteur Institute, Paris, France
Sept 2016 De Duve Institute, Catholic University of Louvain, Brussels, Belgium
Jul 2016 Department of Microbiology and Immunobiology, Harvard Medical School, USA
Dec 2015 6th International Singapore Lipid Symposium, NUS, Singapore
Sep 2015 13th Molecular Analysis of Bacterial Pathogens Meeting, Melbourne, Australia
May 2014 Department of Chemistry, Peking University, Beijing, China
May 2014 Center for Infectious Disease, School of Medicine, Tsinghua University, Beijing, China
Apr 2014 Microbial Genetics and Genomics VI, Paris, France
Aug 2013 15th Asian Chemical Congress, Singapore
Jul 2012 Singapore Center for Environmental Life Sciences Engineering (SCELSE), Singapore
Mar 2012 4th International Singapore Lipid Symposium, NUS, Singapore
Jan 2012 Infectious Disease IRG workshop, Singapore-MIT Alliance for Research and Technology (SMART), Singapore
Jan 2012 Department of Microbiology, NUS, Singapore

LIST OF PUBLICATIONS

Publications arising from independent research laboratory

Tan WB, Chng SS[#] (2022) Genetic interaction mapping highlights key roles of the Tol-Pal complex. *Mol Microbiol* in press (doi:10.1111/mmi.14882) ([#]corresponding author)

Goodall ECA, Isom GL, Rooke JL, Pullela K, Icke C, Yang Z, Boelter G, Jones A, Warner I, Da Costa R, Zhang B, Rae J, Tan WB, Winkle M, Delhaye A, Heinz E, Collet JF, Cunningham AF, Blaskovich MA, Parton RG, Cole JA, Banzhaf M, Chng SS, Vollmer W, Bryant JA, Henderson IR (2021) Loss of YhcB results in dysregulation of coordinated peptidoglycan, LPS and phospholipid synthesis during *Escherichia coli* cell growth. *PLoS Genet* 17:e1009586.

Low WY, Thong SH, Chng SS[#] (2021) ATP disrupts lipid-binding equilibrium to drive retrograde transport critical for bacterial outer membrane asymmetry. *Proc Natl Acad Sci* USA 118: e2110055118. ([#]corresponding author)

Low WY[#], Chng SS[#] (2021) Current mechanistic understanding of intermembrane lipid trafficking important for maintenance of bacterial outer membrane lipid asymmetry. *Curr Opin Chem Biol* 65:163-171. ([#]co-corresponding author)
(*invited review for themed issue on Mechanistic Biology*)

Bryant JA, Morris FC, Knowles TJ, Maderbocus R, Heinz E, Boelter G, Alodaini D, Colyer A, Wotherspoon PJ, Staunton KA, Jeeves M, Browning DF, Sevastsyanovich YR, Wells TJ, Rossiter AE, Bavro VN, Sridhar P, Ward DG, Chong ZS, Goodall ECA, Icke C, Teo A, Chng SS, Roper DI, Lithgow T, Cunningham AF, Banzhaf M, Overduin M, Henderson IR (2020) Structure of dual-BON domain protein DolP identifies phospholipid binding as a new mechanism for protein localization. *eLife* 9:e62614.

Bryant JA, Cadby IT, Chong ZS, Boelter G, Sevastsyanovich YR, Morris FC, Cunningham AF, Kritikos G, Meek RW, Banzhaf M, Chng SS, Lovering AL, Henderson IR (2020) Structure-function characterization of the conserved regulatory mechanism of the *Escherichia coli* M48-metalloprotease BepA. *J Bacteriol* (in press).

Jiang XE*, Tan WB*, Shrivastava R*, Seow DCS, Chen SL, Guan XL, Chng SS# (2020) Mutations in enterobacterial common antigen biosynthesis restore outer membrane barrier function in *Escherichia coli* mutants. *Mol Microbiol* 114:991-1005. (*equal contribution, #corresponding author)

Li M, Phua ZY, Xi Y, Xu Z, Nyantakyic SA, Li W, Jackson M, Wong MW, Lam Y, Chng SS#, Go ML#, Dick T# (2020) Potency increase of spiroketal analogs of membrane inserting indolyl mannich base antimycobacterials is due to acquisition of Mmpl3 inhibition. *ACS Infect Dis* 6:1882-1893. (#co-corresponding authors)

Dupont C*, Chen Y*, Xu Z, Roquet-Banères F, Blaise M, Witt AK, Dubar F, Biot C, Guérardel Y, Maurer FP, Chng SS#, Kremer L# (2019) A piperidinol-containing molecule is active against *Mycobacterium tuberculosis* by inhibiting the mycolic acid flippase activity of MmpL3. *J Biol Chem* 294:17512-17523. (*equal contribution; #co-corresponding authors)

Shrivastava R#, Chng SS# (2019) Lipid trafficking across the Gram-negative cell envelope. *J Biol Chem* 294:14175-14184. (#co-corresponding authors)
(*invited review for 2019 ASBMB Walter Shaw Young Investigator Award in Lipid Research*)

Ercan B*, Low WY*, Liu X, Chng SS# (2019) Characterization of interactions and phospholipid transfer between substrate binding proteins of the OmpC-Mla system. *Biochemistry* 58,114-119. (*equal contribution, #corresponding author)
(*invited contribution to "Future of Biochemistry: The International Issue" (Jan 2019)*)

Shetty A, Xu Z, Lakshmanan U, Hill J, Choong ML, Chng SS, Yamada Y, Poulsen A, Dick T, Gengenbacher M (2018) Novel acetamide indirectly targets mycobacterial transporter MmpL3 by proton motive force disruption. *Front Microbiol* 9:2960.

Yeow J*, Tan KW*, Holdbrook DA*, Chong ZS, Marzinek JK, Bond PJ#, Chng SS# (2018) The architecture of the OmpC-MlaA complex sheds light on the maintenance of outer membrane lipid asymmetry in *Escherichia coli*. *J Biol Chem* 293:11325-11340. (*equal contribution, #co-corresponding authors)

Shrivastava R, Jiang XE, Chng SS# (2017) Outer membrane lipid homeostasis via retrograde phospholipid transport in *Escherichia coli*. *Mol Microbiol* 106:395-408. (#corresponding author)

Isom G, Davies N, Chong ZS, Bryant J, Jamshad M, Sharif M, Cunningham A, Knowles T, Chng SS, Cole J, Henderson I (2017) MCE domain proteins: conserved inner membrane lipid-binding proteins required for outer membrane homeostasis. *Sci Rep* 7:8608.

Xu ZJ, Meshcheryakov VA, Poce G, Chng SS[#] (2017) MmpL3 is the flippase for mycolic acids in mycobacteria. *Proc Natl Acad Sci* USA 114:7993-7998. ([#]corresponding author)

Thong SH,* Ercan B,* Torta F, Fong ZY, Wong HYA, Wenk MR, Chng SS[#] (2016) Defining key roles for auxiliary proteins in an ABC transporter that maintains bacterial outer membrane lipid asymmetry. *eLife* 5:e19042. (*equal contribution; [#]corresponding author)

Chong ZS, Woo WF, Chng SS[#] (2015) Osmoporin OmpC forms a complex with MlaA to maintain outer membrane lipid asymmetry in *Escherichia coli*. *Mol Microbiol* 98:1133-1146. ([#]corresponding author)

Publications arising from postdoctoral research work

Chng SS, Dutton, RJ, Denoncin K, Vertommen D, Collet JF, Kadokura H, Beckwith J (2012) Overexpression of the rhodanese PspE, a single cysteine-containing protein, restores disulfide bond formation to an *Escherichia coli* strain lacking DsbA. *Mol Microbiol* 85:996-1006.

Publications arising from graduate research work

Chng SS,* Xue M,* Garner RA, Kadokura H, Boyd D, Beckwith J, Kahne D (2012) Disulfide rearrangement triggered by translocon assembly controls lipopolysaccharide export. *Science* 337:1665-1668. (*equal contribution)

Chimalakonda G, Ruiz N, Chng SS, Garner RA, Kahne D, Silhavy TJ (2011) Lipoprotein LptE is required for the assembly of LptD by the β-barrel assembly machine in the outer membrane of *Escherichia coli*. *Proc Natl Acad Sci* USA 108:2492-2497.

Freinkman E, Chng SS, Kahne D (2011) The complex that inserts lipopolysaccharide into the bacterial outer membrane forms a two-protein plug-and-barrel. *Proc Natl Acad Sci* USA 108:2486-2491.

Ruiz N, Chng SS, Hiniker A, Kahne D, Silhavy TJ (2010) Non-consecutive disulfide bond formation in an essential integral outer membrane protein. *Proc Natl Acad Sci* USA 107:12245-12250.

Chng SS,* Gronenberg LS,* Kahne D (2010) Proteins required for lipopolysaccharide assembly in *Escherichia coli* form a trans-envelope complex. *Biochemistry* 49:4565-4567. (*equal contribution)

Chng SS, Ruiz N, Chimalakonda G, Silhavy TJ, Kahne D (2010) Characterization of the two-protein complex in *Escherichia coli* responsible for lipopolysaccharide assembly at the outer membrane. *Proc Natl Acad Sci* USA 107:5363-5368.

Wu T, McCandlish AC, Gronenberg LS, Chng SS, Silhavy TJ, Kahne D (2006) Identification of a protein complex that assembles lipopolysaccharide in the outer membrane of *Escherichia coli*. *Proc Natl Acad Sci* USA 103:11754-11759.

Publications arising from undergraduate research work

Zhao YJ, Chng SS, Loh TP (2007) Lewis acid-promoted intermolecular acetal-initiated cationic polyene cyclizations. *J Am Chem Soc* 129:492-493.

Chng SS, Hoang TG, Lee WWW, Tham MP, Ling HY, Loh TP (2004) Synthetic Studies towards anti-SARS agents: application of an indium-mediated allylation of α-aminoaldehydes as the key step towards an intermediate. *Tetrahedron Lett* 45:9501-9504.

Tan KT, Chng SS, Cheng HS, Loh TP (2003) Development of a highly α-regioselective metal-mediated allylation reaction in aqueous media: new mechanistic proposal for the origin of α-homoallylic alcohols. *J Am Chem Soc* 125:2958-2963.

Chng SS, Xu J, Loh TP (2003) A divergent approach to apoptolidin and FD-891: asymmetric synthesis of a common intermediate. *Tetrahedron Lett* 44:4997-5000.