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Employment

Jan 19 - present	Associate Dean (Research), Graduate College, NTU
Mar 17 – Feb 19	Programme Chair (Sustainable Earth), Interdisciplinary Graduate School, NTU
Aug 16 - present	Cluster Director, Renewables and Low-Carbon Generation (Solar), Energy Research Institute at NTU (ERI@N)
Mar 16 - present	Associate Professor, Nanyang Technological University
Sep 12 - present	Deputy Director, Centre for Disruptive Photonic Technologies (CDPT), Nanyang Technological University
Sep 09 - Oct 16	Research Thrust Leader, CNRS International-Thales-NTU Research Alliance (CINTRA)
Jul 09 - Feb 16	Nanyang Assistant Professor, Nanyang Technological University, Singapore
Jul 11 - Jul 12	Visiting Professor, Center for Nano Science and Nanotechnology (CNST), Italian Institute of Technology
Mar 07 - Jun 09	Postdoctoral Researcher III, Department of Electrical and Computer Engineering, University of California, San Diego
Jan 07 - Aug 07	Senior Scientist, co-founder, Apix Nanovation, Inc., Poway
Apr 06 - Mar 07	Postdoctoral Researcher II, Department of Electrical and Computer Engineering, University of California, San Diego
Mar 05 - Mar 06	Postdoctoral Researcher I, Center for Polymers and Organic Solids, University of California, Santa Barbara
Sep 00 - Aug 01	Visiting Researcher, Institute for Polymers and Organic Solids, University of California, Santa Barbara

Academic qualifications

Feb 2005	Ph.D., University of Pavia Applied Physics, School of Mathematical, Physical and Natural Sciences
Feb 2005	Joint Certificate of Doctoral Studies University of California at Santa Barbara (Physics Department) and University of Pavia
July 2000	Laurea Diploma, University of Pavia Applied Physics, School of Mathematical, Physical and Natural Sciences
Sep 00 - May 01	Ambassadorial Scholar of the Rotary Foundation
Sep 94 - Jul 00	Scholar of the Almo Collegio Borromeo, Pavia

Memberships of professional societies and commissions of trust

Since 2019	Fellow, International Society for Optics and Photonics (SPIE)
Since 2018	Fellow, Optical Society of America (OSA)
Since 2015	Senior Member, International Society for Optics and Photonics (SPIE)
Since 2011	Council Member, Institute of Physics Singapore (IPS)
Since 2011	Lifetime Member, Institute of Physics Singapore (IPS)
Since 2001	Member, Materials Research Society (MRS)
Since 1999	Member, Italian Physical Society (SIF)

Awards

- 2014 IPS Omicron Nanotechnology Physics Medal and Prize for Outstanding Physics Research
- 2014 NTU-SPMS Young Researcher Award
- 2010 ProSPER.NET-Scopus Young Investigator Award on Sustainable Development

Teaching and student supervision

- Since 2010 taught at least one physics course per semester at undergraduate or graduate level, on topics such as Electricity and Magnetism, Thermal Physics, Solid State Physics, Nanoscale Physics, and Advanced Optical Spectroscopy
- Graduated 12 PhD students and 5 MSc/MEng students as main advisor; currently advising 4 PhD students

Current research projects

- 2019-2024: Superconducting nanowire single photon detectors (Singapore National Research Foundation, Quantum Engineering Programme, NRF-QEP, PI)
- 2019-2024: Perovskites for tunable nanoantennas at visible and infra-red frequencies (Singapore Agency for Science, Technology and Research, Advanced Manufacturing in Engineering Programme A*STAR-AME, PI)
- 2017-2022: Quantum and topological nanophotonics (Singapore Ministry of Education Tier 3 Research Programme, MOE-Tier 3, co-PI)
- 2015-2021: Perovskite optoelectronics: multidimensional perovskites for high performance solution-processed light-emitting devices (Singapore National Research Foundation, Competitive Research Programme, NRF-CRP, co-PI)
- 2019-2021: Probing the biotic/abiotic interface of living cells on metasurfaces (Singapore Ministry of Education, Tier 1 Project, MOE-Tier 1, PI)
- 2017-2021: Nanophotonic quantum toolkit on the fibre platform (Singapore Agency for Science, Technology and Research, Quantum Technologies for Engineering Programme, A*STAR-QTE, co-PI)
- 2019-2021: Application of machine learning to complex photonics (Singapore Ministry of Education, Tier 1 Project, MOE-Tier 1, co-PI)

Patents

1. Apparatus for electromagnetic wave detection, M.D. Birowosuto, D. Cortecchia, C. Soci, WO/2018/021975 (filed on 07/28/2017).
2. Device including halide perovskite structure, methods of forming and operating the same, C. Soci, B. Gholipour, G. Adamo, D. Cortecchia, US/2017/0276836 (filed on 03/28/2017).
3. Light-emitting device, method of forming and operating the same, C. Soci, X.Y. Chin, D. Cortecchia, A. Bruno, J. Yin, F. Maddalena, US/2017/0005296 (filed on 06/30/2016).
4. Perovskites for optoelectronic applications, S.G. Mhaisalkar, T. Baikie, N. Mathews, P.P. Boix, C. Soci, D. Cortecchia, US/2016/0149145 (filed on 11/24/2015).
5. Vertical Group IlI-V nanowires on Si, heterostructures, flexible arrays, and fabrication, D. Wang, W. Wei, X.-Y. Bao, C. Soci. WO/2010/062644 (filed on 10/28/2009).
6. Nanowire array-based light emitting diodes and lasers, D. Wang, X.-Y. Bao, B. Xiang, C. Soci, D. Aplin, WO/2008/140611 (filed on 12/18/2007).
7. Nanowire photodetector and image sensor with internal gain, D. Wang, C. Soci, Y.-H. Lo, A. Zhang, D. Aplin, L. Wang, S. Dayeh, X.-Y. Bao, WO/2008/143727 (filed on 02/26/2008).
8. Enhancing performance characteristics of organic semiconducting films by improved solution processing, G.C. Bazan, A. Mikhailovsky, D. Moses, T.Q. Nguyen, J. Peet, C. Soci, US/2009/0032808 (filed on 12/03/2007); US/2013/0240845 (filed on 11/05/2012).

Publication summary: (all publications available at http://www1.spms.ntu.edu.sg/~oson/publications.html)

>130 journal papers, >60 conference proceedings, 9 book chapters, >60 invited, keynote and plenary presentations at conferences and workshops, >250 contributed presentations at conferences and workshops, ~11000 citations; h-index: 50 (Google Scholar).

Representative publications (by research areas)

Light emission and detection at the nanoscale (on the fundamental mechanisms of charge carrier photogeneration, transport and recombination in low dimensional material structures - quantum dots, nanowires, etc., at extremely broad time and energy scales, and prototype devices such as nanowire lasers, quantum dot solar cells, and nanowire photodetectors):

- Topological insulator metamaterial with giant circular photogalvanic effect**,** X. Sun, G. Adamo, M. Eginligil, H.N.S. Krishnamoorthy, N.I. Zheludev, C. Soci, arXiv:2008.08772
- Intrinsic lead ion emissions in zero-dimensional Cs_4PbBr_6 nanocrystals**,** J. Yin, Y. Zhang, A. Bruno, C. Soci, O. Bakr, J.-L. Bredas, O. Mohammed, *ACS Energy Lett.* 2, 2805 (2017)
- Hot exciton cooling and multiple exciton generation in PbSe quantum dots**,** M. Kumar, S. Vezzoli, Z. Wang, V. Chaudhary, R.V. Ramanujan, G.G. Gurzadyan, A. Bruno, C. Soci, *Phys. Chem. Chem. Phys.* 18, 31107 (2016)
- Small-size effects on electron transfer in P3HT/InP quantum dots, J. Yin, M. Kumar, Q. Lei, L. Ma, R.S.S. Kumar, G. Gurzadyan, C. Soci, *J. Phys. Chem. C*, 119, 26783 (2015)
- GaAs/AlGaAs nanowire photodetector, X. Dai, S. Zhang, Z. Wang, G. Adamo, H. Liu, Y.Z. Huang, C. Couteau, C. Soci, *Nano Lett.* 14, 2688 (2014)
- Monolithic integration of III-V nanowire with photonic crystal microcavity for vertical light emission, A. Larrue, C. Wilhelm, G. Vest, S. Combrié, A. De Rossi, C. Soci, *Optics Expr.* 20, 7758 (2012)
- Tailoring the Vapor-Liquid-Solid growth toward the self-assembly of GaAs nanowire junctions, X. Dai, S.A. Dayeh, V. Veeramuthu, A. Larrue, J. Wang, H. Su, C. Soci, *Nano Lett.* 11, 4947 (2011)
- Nanowire photodetectors, C. Soci, A. Zhang, X.-Y. Bao, H. Kim, Y. Lo, D. Wang, *J. Nanosci. Nanotechnol.* 10, 1430 (2010)
- A systematic study on the growth of GaAs nanowires by Metal-Organic Chemical Vapor Deposition, C. Soci, X.-Y. Bao, D.P.R. Aplin, D. Wang, *Nano Lett.* 8, 4275 (2008)
- ZnO nanowire UV photodetectors with high internal gain, C. Soci, A. Zhang, B. Xiang, S.A. Dayeh, D.P.R. Aplin, J. Park, X.Y. Bao, YH. Lo, D. Wang, *Nano Lett.* 7, 1003 (2007)

New materials and structures for metamaterials (on the investigation of unconventional material platforms - hybrid perovskites, phase-change chalcogenide, topological insulators, etc., to demonstrate new metamaterial concepts and control light-matter interaction):

- Metamaterial enhancement of metal-halide perovskite luminescence, G. Adamo, H. Krishnamoorthy, D. Cortecchia, B. Chaudhary, V. Nalla, N. Zheludev, C. Soci, *Nano Lett*., accepted (2020); arXiv:2005.10990
- Infrared dielectric metamaterials from high refractive index chalcogenides**,** H.N.S. Krishnamoorthy, G. Adamo, J. Yin, V. Savinov, N.I. Zheludev, C. Soci, *Nat. Commun.* 11, 1692 (2020)
- Engineering the emission of broadband 2D perovskites by polymer distributed Bragg reflectors**,** P. Lova, D. Cortecchia, H.N.S. Krishnamoorthy, P. Giusto, C. Bastianini, A. Bruno, D. Comoretto, C. Soci, *ACS Photonics* 5, 867 (2018)
- A non-volatile chalcogenide switchable hyperbolic metamaterial**,** H.N.S. Krishnamoorthy, B. Gholipour, N.I. Zheludev, C. Soci, *Adv. Optical Mater.* 1800332 (2018)
- Plasmonics of topological insulators at optical frequencies**,** J. Yin, H.N.S. Krishnamoorthy, G. Adamo, A.M. Dubrovkin, Y.D. Chong, N.I. Zheludev, C. Soci, *NPG Asia Materials* 9, e425 (2017)
- Organometallic perovskite metasurfaces**,** B. Gholipour, G. Adamo, D. Cortecchia, H.N.S. Krishnamoorthy, M.D. Birowosuto, N.I. Zheludev, C. Soci, *Adv. Mat.* 29, 1604268 (2017)
- Plasmon-polaron coupling in conjugated polymer on infrared nanoantennas, Z. .Wang, J. Zhao, B. Frank, Q. Ran, G. Adamo, H. Giessen, C. Soci, *Nano Lett.*15, 5382 (2015)
- Plasmonic nanoclocks, H. Liu, Z. Wang, .J. Huang, H.J. Fan, N.I. Zheludev, C. Soci, *Nano Lett.* 14, 5162 (2014)

Organic optoelectronics (on the photophysical properties of organic semiconductors - conjugated polymers, molecular crystals, small molecules, and organic-inorganic hybrids - organo-metal halide perovskites, heterostructures, etc. and their application in low-cost organic solar cells, light-emitting diodes, field-effect transistors, and sensors):

- Large polaron self-trapped states in three-dimensional metal-halide perovskites, W.P.D. Wong, J. Yin, B. Chaudhary, X.-Y. Chin, D. Cortecchia, S-Z.A. Lo, A.C. Grimsdale, G. Lanzani, C. Soci, *ACS Materials Lett.* 2, 20 (2020)
- White light emission in low-dimensional perovskites**,** D. Cortecchia, J. Yin, A. Petrozza, C. Soci, *J. Mat. Chem. C* 7, 4956 (2019)
- Brightness enhancement in pulsed-operated perovskite light-emitting transistors**,** F. Maddalena, X.Y. Chin, D. Cortecchia, A. Bruno, C. Soci, *ACS Appl. Mater. Interfaces* 10, 37316 (2018)
- Structure-controlled optical thermoresponse in Ruddlesden-Popper layered perovskites**,** D. Cortecchia, S. Neutzner, J. Yin, T. Salim, A.R.S. Kandada, A. Bruno, Y.M. Lam, J. Martí-Rujas, A. Petrozza, C. Soci, *APL Materials* 6, 114207 (2018)
- Polaron self-localization in white-light emitting hybrid perovskites, D. Cortecchia, J. Yin, A. Bruno, S.-Z. A. Lo, G.G. Gurzadyan, S. Mhaisalkar, J.L. Bredas, C. Soci, *J. Mater. Chem. C* 5, 2771 (2017)
- X-ray scintillation in lead halide perovskite crystals**,** M.D. Birowosuto, D. Cortecchia, W. Drozdowski, K. Brylew, W. Lachmanski, A. Bruno, C. Soci, *Scientific Reports*, 6, 37254 (2016)
- Lead iodide perovskite light-emitting transistor, X.Y. Chin, D. Cortecchia, J. Yin, A. Bruno, C. Soci, *Nat. Commun.* 6, 7383 (2015)
- Interfacial charge transfer anisotropy in polycrystalline lead iodide perovskite films, J. Yin, D. Cortecchia, A. Krishna, S. Chen, N. Mathews, A.C. Grimsdale, C. Soci, *J. Phys. Chem. Lett.* 6, 1396 (2015)
- Mapping polarons in polymer FETs by charge modulation microscopy in the mid-infrared, X.Y. Chin, J. Yin, Z. Wang, M. Caironi, C. Soci, *Scientific Reports* 4, 3626 (2014)
- Photoconductivity of a novel low-bandgap conjugated polymer**,** C. Soci, I.-W. Hwang, D. Moses, Z. Zhu, D. Waller, R. Gaudiana, C.J. Brabec, and A.J. Heeger, *Adv. Funct. Mat.* 17, 632 (2007)
- Charge carrier relaxation dynamics in highly ordered poly(p-phenylene vinylene): effects of carrier bimolecular recombination and trapping**,** C. Soci, D. Moses, Q-H. Xu, and A.J. Heeger, *Phys. Rev. B* 72, 245204 (2005)
- Light emission from an ambipolar semiconducting polymer Field-Effect Transistor, J. Swensen, C. Soci and A.J. Heeger, *Appl. Phys. Lett.* 87, 253511 (2005)

Specialty optical fibres and photonic networks (on the integration of functional materials and devices within optical fibres, the development of quantum technologies on the fibre platform, the exploration of network architectures for optical neuromorphic computing, and the application of deep-learning methods for optical fibre imaging and signal transmission):

- Image reconstruction through a multimode fiber with a simple neural network architecture**,** C. Zhu, E.A. Chan, Y. Wang, W. Peng, R. Guo, B. Zhang,* C. Soci,* Y. Chong,* arXiv:2006.05708
- Coherent perfect absorption of single photons in a fibre network, A. Vetlugin,* R. Guo, A. Xomalis, S. Yanikgonul, G. Adamo, C. Soci,* N.I. Zheludev, *Appl. Phys. Lett.* 115, 191101 (2019)
- Optical NP problem solver on laser-written waveguide platform**,** M.R. Vazquez, V. Bharadwaj, B. Sotillo, S.-Z.A. Lo, R. Ramponi, N.I. Zheludev, G. Lanzani, S.M. Eaton, C. Soci, *Opt. Expr.* 26, 702 (2018)
- All-optical implementation of the ant colony optimization algorithm**,** W. Hu, K. Wu, P.P. Shum, N. Zheludev, C. Soci, *Scientific Reports* 6, 26283 (2016)
- Lithography assisted fiber-drawing nanomanufacturing**,** B. Gholipour, P. Bastock, L. Cui, C. Craig, K. Khan, D.W. Hewak, C. Soci, *Scientific Reports* 6, 35409 (2016)
- Amorphous metal-sulphide microfibers enable photonic synapses for brain-like computing, B. Gholipour, P. Bastock, C. Craig, K. Khan, D. Hewak, C. Soci, *Adv. Opt. Mat.* 3, 635 (2015)
- Computing matrix inversion with optical networks, K. Wu, C. Soci,* P.P. Shum, N.I. Zheludev, *Optics Expr.* 22, 295 (2014)
- An optical fibre network oracle for NP-complete problems, K. Wu, J. García de Abajo, C. Soci,* P.P. Shum, N.I. Zheludev, *Light: Science & Applications* 3, e147 (2014)