Prof. Sohini Kar-Narayan, PhD FIMMM

Professor of Device & Energy Materials, University of Cambridge

PERSONAL INFORMATION

Prof. Sohini Kar-Narayan ▪ ORCID: **0000-0002-8151-1616** ▪ Date of birth: **3rd January, 1982** ▪ Nationality: **British** ▪ Website: **https://www.kar-narayan.msm.cam.ac.uk/**

• EDUCATION

2004 – 2008 **PhD in Physics** (awarded March 2009); Dept. of Physics, Indian Institute of Science, Bangalore
Thesis title: *Spatially resolved studies of electronic phase separation and microstructure effects in hole-doped managanites*; **Supervisor:** Prof. A. K. Raychaudhuri
Related Prize: Senior Research Fellowship awarded by CSIR-UGC, Govt. of India, 2006.

2001 – 2004 **MS in Physics;** Department of Physics, Indian Institute of Science, Bangalore, India
CGPA: 6.8 (on a scale of 8); **Project title:** *Experiments conducted on nano-manganites*
Related Prize: Junior Research Fellowship awarded CSIR-UGC, Govt. of India, 2004.

1998 – 2001 **BSc with Honours in Physics;** Presidency College, University of Calcutta, Kolkata, India.

• EMPLOYMENT & AFFILIATIONS

2021 – **Professor of Device & Energy Materials**, University of Cambridge

2021 – **Co-founder & Director, ArtioSense Limited** (www.artiosense.co.uk)

2018 – 2021 **Associate Editor**, *Applied Materials Today* (Elsevier)
Reader in Device & Energy Materials, Department of Materials Science & Metallurgy, Cambridge

2015 – 2018 **University Lecturer**, Dept. of Materials Science, Cambridge University

2012 – 2014 **Royal Society Dorothy Hodgkin Fellow**, Dept. of Materials Science, Cambridge University

2012 – 2018 **Director of Studies** (Physical Sciences), Homerton College, Cambridge University

2008 – 2011 **Postdoctoral Research Associate**, Dept. of Materials Science, Cambridge University

• FELLOWSHIPS, AWARDS & ACADEMIC HONOURS

2022 **Fellowship of the Institute of Materials, Minerals & Mining (IoM3)**

2022 **Armourers & Brasiers' Venture Prize 2022**

2022 **Cambridge University Students Union Innovation in Teaching Award** (student-led award)

2021 **WES Top 50 Women in Engineering 2021**

2018 **Chemical Communications Emerging Investigator**, Royal Society of Chemistry Publishing

2016 & 2014 **Departmental Teaching Prize**, University of Cambridge

2015 **World Economic Forum Young Scientist Award**, awarded to 50 extraordinary scientists under 40

2015 **Liddiard Memorial Lecture**, Institute for Materials, Minerals & Mining (IOM3)

2015 **ERC Starting Grant** awarded by the European Research Council

2012 **Royal Society Dorothy Hodgkin Fellowship** (4% success rate)

2012 **Official Fellowship**, Clare Hall College, Cambridge

2009 **Junior Research Fellowship**, Clare Hall College, Cambridge

2006 **Senior Research Fellowship**, Centre for Scientific and Industrial Research, India (Stipend for second half of PhD studies, based on nomination and panel interview)

2004 **Junior Research Fellowship**, Centre for Scientific and Industrial Research, India (Stipend for first half of PhD studies, ranked in top 10% of examinees nationwide)

2001 **MS Scholarship** awarded by the Indian Institute of Science (Full scholarship for top 8 candidates in highly competitive national examination and panel interview)

• RESEARCH GROUP & FUNDING

I am internationally recognised for **my pioneering research on functional materials for energy harvesting, sensing and biomedical applications**, as demonstrated by my high-impact publications, frequent invitations to speak at international conferences, significant levels of media attention and my accumulated grant income of approximately **£3.2M as Principle Investigator (including a €1.7M ERC Starting Grant in 2015), and a further £2.2M as Co-Investigator**. Over the past 10 years (that included two periods of maternity leave), **I have successfully established an independent and multi-disciplinary research group (12-15 members)**, first as a Royal Society Dorothy Hodgkin Fellow and University Lecturer, then as a Reader (Associate Prof) in Device & Energy Materials**. 6 PhD students have graduated from my group (+ 1 passed viva and awaiting graduation), and 7 of my group members have secured Faculty positions** in UK, South Korea, Spain, India & Israel.

- **SELECTED PUBLICATIONS (*denotes corresponding author)**

Below is a list of **selected recent publications**: (For a full publication list and citations, please see my Google Scholar page: http://scholar.google.co.uk/citations?user=b3Ifr0IAAAAJ&hl=en). >5100 citations, h-index = 34.

1. "3D-printed hierarchical pillar array electrodes for high-performance semi-artificial photosynthesis", X Chen, JM Lawrence, LT Wey, L Schertel, Q Jing, S Vignolini, CJ Howe, **S. Kar-Narayan**, JZ Zhang, *Nature Materials* 21, 811 (2022)
2. "Triboelectric yarn with electrospun functional polymer coatings for highly durable and washable smart textile applications", T Busolo, P Szewczyk, M Nair, U Stachewicz, **S Kar-Narayan***, *ACS Applied Materials & Interfaces* 10.1021/acsami.1c00983 (2021)
2. "Aerosol-jet-printed, conformable microfluidic force sensors", Q Jing, A Pace, L Ives, N Catic, V Khanduja, J Cama, **S Kar-Narayan***, *Cell Reports Physical Science* 10.1016/j.xcrp.2021.100386 (2021)
3. "Unprecedented Dipole Alignment in α-phase Nylon-11 Nanowires for High-Performance Energy Harvesting Applications", YS Choi, SK Kim, M Smith, F Williams, ME Vickers, JA Elliott, **S Kar-Narayan***, *Science Advances* 6, eaay5065 (2020).
4. "Aerosol-jet printing facilitates the rapid prototyping of microfluidic devices with versatile geometries and precise channel functionalization", N Ćatić, L Wells, K Al Nahas, M Smith, Q Jing, UF Keyser, J Cama, **S Kar-Narayan***, *Applied Materials Today* 19, 100618 (2020).
5. "Freestanding Functional Structures by Aerosol-Jet Printing for Stretchable Electronics and Sensing Applications" Q Jing, YS Choi, M Smith, C Ou, T Busolo, **S Kar-Narayan***, *Adv. Mater. Technol. 4,* 1900048 (2019).
6. "Surface potential tailoring of PMMA fibers by electrospinning for enhanced triboelectric performance", T Busolo, DP Ura, SK Kim, MM Marzec, A Bernasik, U Stachewicz, **S. Kar-Narayan***, *Nano Energy* 57, 500 (2019).
7. "Fully printed organic–inorganic nanocomposites for flexible thermoelectric applications", C Ou, AL Sangle, A Datta, Jing,T Busolo, T Chalklen, V Narayan, **S Kar-Narayan***, *ACS Appl. Mater. Interfaces 10*, 19580 (2018).
8. "A Triboelectric Generator Based on Self-poled Nylon-11 Nanowires Fabricated by Gas-flow Assisted Template Wetting", YS Choi, Q Jing, A Datta, C Boughey & **S Kar-Narayan*,** *Energy & Environmental Science 10*, 2180 (2017).
**Selected as part of themed collection: "2017 Energy and Environmental Science HOT articles"
9. "Piezoelectric Nylon-11 Nanowire Arrays Grown by Template Wetting for Vibrational Energy Harvesting Applications" A. Datta, Y. S. Choi, E. Chalmers, C. Ou & **S Kar-Narayan***, *Adv. Funct. Mater. 27*, 1604262 (2017).
10. "A scalable nanogenerator based on piezoelectric polymer nanowires with high energy conversion efficiency", RA Whiter, V Narayan & **S Kar-Narayan***, *Advanced Energy Materials 4*, 1400519 (2014).

- **SELECTED INVITED TALKS AT INTERNATIONAL CONFERENCES**

2022 **Plenary Lecture**, 5th Annual Energy Harvesting Society Meeting (EHS22), Baltimore, USA
2022 **Keynote Talk**, Nanomechanical Testing in Materials Research and Development VIII, Split, Croatia
2022 **Keynote Talk**, RMS Microscopy: Advance, Innovation, Impact 2022 Meeting, London, UK
2022 **Invited Talk**, European Materials Research Society (E-MRS) Fall, Warsaw, Poland
2021 **Keynote Talk**; 15th International Conference on Materials Chemistry (MC15), Dublin, Ireland
2021 **Keynote Talk**, IEEE Sensors conference, Sydney, Australia
2021 **Invited Talk**, 2021 Virtual MRS Spring Meeting & Exhibit (Symposium NM09), US
2021 **Invited Talk**, Intl. Conference on Recent Trends in Condensed Matter Physics (Virtual), India
2021 **Invited Talk**, Nano Korea 2021 - The 19th International Nano Technology Exhibition, S Korea
2020 **Invited Talk**, 2020 Virtual MRS Spring/Fall Meeting & Exhibit (Symposium S.SM03), US
2020 **Invited Talk**, Intl. Conference on Advanced Materials for Energy & Information Technology (Virtual), China
2020 **Invited Talk**, 5th International conference on Emerging Electronics (Virtual), India
2019 **Invited Talk**, 4th International Conference on Nanoenergy and Nanosystems (NENS2019), Beijing, China
2019 **Invited Talk**, 3rd Annual Energy Harvesting Society Meeting, Baltimore, US
2018 **Keynote Talk**, 4th Intl. Conference on Nanogenerators & Piezotronics, Seoul, S Korea
2018 **Invited Talk**, 2nd Annual Energy Harvesting Society Meeting, Philadelphia, US
2017 **Invited Talk**, 4th International Conference on Smart Materials & Structures, London, UK.
2017 **Invited Talk (x2)**, MRS Spring Meeting, Phoenix US
2016 **Invited Talk**, Pacific Rim Symposium of Surfaces Coatings & Interfaces, Hawaii, US

- **INVITED/COMMISSIONED REVIEW ARTICLES (*denotes corresponding author)**

1. "Roadmap on Nanogenerators & Piezotronics, **S. Kar-Narayan*** et al., *APL Materials* (2022, in press)
2. "Piezoelectric polymers: theory, challenges and opportunities", M Smith & **S Kar-Narayan***, *International Materials Reviews* (2021)
3. "Materials-Related Strategies for Highly Efficient Triboelectric Energy Generators", YS Choi, SW Kim, **S Kar-Narayan***, *Advanced Energy Materials* 11, 2003802 (2021)

4. “Nylon-11 nanowires for triboelectric energy harvesting”, YS Choi & **S Kar-Narayan***, *EcoMat* 10.1002/eom2.12063 (2020)
5. “Biosensors Based on Mechanical and Electrical Detection Techniques” , T Chalklen, Q Jing, **S Kar-Narayan***, *Sensors* 20, 5605 (2020)
6. “Caloric effects in perovskite oxides” A. Barman, **S. Kar-Narayan**, D. Mukherjee, *Advanced Materials Interfaces*, 10.1002/admi.201900291 (2019)
7. “Nanostructured polymer-based piezoelectric and triboelectric materials and devices for energy harvesting applications”, Q Jing & **S Kar-Narayan***, *Journal of Physics D: Applied Physics* 51, 303001 (2018)
8. “Piezoelectricity in non-nitride III–V nanowires: Challenges and opportunities” Y Calahorra & **S. Kar-Narayan***, *Journal of Materials Research* 33, 611 (2018)
9. “Electroactive polymers for sensing”, T. Wang, M. Farajollahi, YS Choi, I-T Lin, JE Marshall, NM Thompson, **S Kar-Narayan**, JDW Madden & SK Smoukov, *Interface Focus* 6, 20160026 (2016)
10. “Polymer-based nano-piezoelectric generators for energy harvesting applications”, S Crossley, RA Whiter & **S Kar-Narayan***, *Materials Science and Technology* 30, 1613 (2014)
11. “Caloric effects near ferroic phase transitions”, X Moya, **S Kar-Narayan**, ND Mathur, *Nat. Mater* 13, 439 (2014)
12. “Electrocaloric materials for cooling applications” **S Kar-Narayan*** & ND Mathur, *Ferroelectrics* 431, 1 (2012)

- **INTELLECTUAL PROPERTY AND COMMERCIALISATION (including patent applications)**

2021 **Co-founder & Director, ArtioSense Limited** (www.artiosense.co.uk); spinout from Cambridge University
2020 GB 2013560.4 “A microfluidic sensor” [**S Kar-Narayan**, Q Jing, L Ives, V Khanduja, J Cama]
2019 GB1905395.8 “Thermoelectric Nanocomposites for Thermal Energy Harvesting” [**S Kar-Narayan**, C. Ou]
2018 GB1815550.7 “Biological material electromechanical interaction platform” [**S Kar-Narayan**, M. Smith]
2018 PCT/GB2018/053331 Nylon-11 nanowires for Triboelectric Generation” [**S Kar-Narayan**, YS Choi]
2017 PCT/EP2017/068810 “Triboelectric Generator, Method for Manufacture thereof” [**S Kar-Narayan**, YS Choi]
2016 US Patent 9,326,423: “Method for limiting the variation in the temperature of an electrical component” [E. Defay, N. D. Mathur, **S. Kar Narayan**, J. Soussi]

- **INVITED BOOK CHAPTERS (*denotes corresponding author)**

1. “Manufacturing routes toward flexible and smart energy harvesters and sensors based on functional nanomaterials”, C Ou, Q Jing, T Busolo, **S Kar-Narayan***, *Advances in Nanostructured Mater. and Nanopatterning Tech* (Elsevier 2020)
2. “Piezoelectric semiconducting nanowires”, Y Calahorra, C Ou, C Boughey, **S Kar-Narayan***, *Semiconductors & Semimetals* (Elsevier 2018)
3. “Ferroelectric and piezoelectric oxide nanostructured films for energy harvesting applications”, A. Datta, D. Mukherjee & **S. Kar-Narayan***, *Metal Oxide-Based Thin Film Structures* (Elsevier 2017)
4. “Magnetoelectric nanocomposites for energy harvesting”, C Boughey & **S Kar-Narayan***, *Magnetoelectric Polymer Based Composites: Fundamentals and Applications* (John Wiley & Sons 2017)
5. “Electrocaloric Multilayer Capacitors”, **S Kar-Narayan***, S Crossley, ND Mathur, *Electrocaloric Materials – New Generation of Coolers* (Springer Publishing 2014)

- **SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS**

8 postdoctoral research associates (PDRAs), 12 graduate students (PhDs, 6 graduated; 1 awaiting viva). 6 past group members have secured Faculty positions in Spain (Dr P Jimenez-Sanchez), India (Dr A Datta, Dr A Sangle), South Korea (Dr Y Choi), UK (Dr Q Jing) & Israel (Dr Y Calahorra).

- **TEACHING ACTIVITIES**

2014 – **Designed, lectured & examined undergraduate courses** (1st year Microstructure and 4th year Energy Harvesting) at Cambridge University; 3 Teaching prizes awarded.
2015 – **Head of Class** of undergraduate Materials practical laboratories, Cambridge University
2016 – **1st & 2nd year undergraduate** (**Part IA & IB) Examiner**

- **ORGANISATION OF SCIENTIFIC MEETINGS**

2022 **Symposium Organiser**, MRS Spring Meeting 2023, San Francisco, USA
2021 **Theme Lead**, Commonweath Science Conference 2021
2021 & 2019 **Symposium organiser**, MRS Virtual 2021 & MRS Spring 2019, Phoenix, USA
2020 **Chair**, 5th Intl. Conf. on Nanogenerators & Piezotronics, Cambridge, UK (postponed due to COVID)
2018 **Symposium Organiser**, Intl. Conf. on Electronic Materials and Nanotech., Jeju, South Korea.
2017 **Symposium Organiser**, European Advanced Materials Congress (EAMC) – Stockholm, Sweden.
2016 **Co-organiser**, Royal Society Scientific Discussion Meeting on Caloric Materials - London, UK.
2015 **Symposium Organiser**, 2015 EUROMAT, Warsaw, Poland.
2015 **Organiser**, 5th Intl. Conf. Materials & Applications for Sensors & Transducers - Mykonos, Greece.

• INSTITUTIONAL RESPONSIBILITIES

2021 – **Facilities Manager**, Mechanical Testing Facility, Dept. of Materials Science & Metallurgy.
2021 – **Head of Device Materials Group**, Dept. of Materials Science & Metallurgy, Cambridge University
2021 – **Syndicate Member**, Dept. of Chemical Engineering & Biotechnology, Cambridge University
2018 – **Committee Member**, Schiff Foundation Fund, Cambridge University
2017 – **Wellbeing Advocate**, Department of Materials Science, Cambridge University
2017 – 2019 **Management Committee Member**, Centre for Doctoral Training in Graphene Tech, Cambridge
2015 – 2016 **Theme Coordinator** for Energy Materials, NanoCDT, Cambridge University
2009 – **Governing Body Member** & **Council Member** ('17-'19), Clare Hall College, Cambridge University

• REVIEWING ACTIVITIES

2021 – **ERC Starting Grant Panel Member** (PE5 – Synthetic Chemistry & Materials)
2021 – **Expert Reviewer/Monitor** for European Commission FET-Open project UncorrelaTEd
2020 – **Review Panel Member** for Academy of Finland's Research Council (Materials Science & Tech)
2020 **Expert Evaluator** for Flanders Innovation & Entrepreneurship, Belgium
2019 – **Outer International Assessment Board Member**, Irish Research Council
2018 – **External Reviewer**, National Science Centre, Poland
2018 – **Awards Committee Member**, MRS Innovation in Materials Characterisation Award
2018 – **Editorial/Advisory Board**, *Cell Reports Phys. Science/J Phys Materials/Nanoenergy Adv./PLOS One*
2018 **Specialist Reviewer**, ERC Consolidator Grant (PE8)
2017 – **Advisory Board Member** for the 14th International Ceramics Congress Perugia, 2018
2016 – **Fellowship Committee Member**, Clare Hall College, Cambridge
2014 – 2019 **Review Panel Member**, Royal Society International Exchanges

***Peer reviewer** for *Nature Mater*, *Nature Commun.*, *Science*, *Science Adv.*, Wiley (*Advanced* family of journals), ACS, RSC and Elsevier journals. **External PhD examiner** (9 students - UK, India, Luxembourg); **Internal PhD examiner** (12)

• MEMBERSHIPS OF PROFESSIONAL BODIES

2022- Institute of Materials, Minerals & Mining (Fellow)
2020- Royal Microscopy Society (AFM&SPM Committee)
2018- Material Research Society (Member)
2012- Royal Society (Dorothy Hodgkin Fellow)