

Andela Šarić

Assistant Professor, IST Austria

[andela.saric@ist.ac.at](mailto:andela.saric@ist.ac.at)

and

Associate Professor of Biological and Soft Matter Physics

Department of Physics and Astronomy

MRC Laboratory for Molecular Cell Biology

University College London, London, UK

[a.saric@ucl.ac.uk](mailto:a.saric@ucl.ac.uk)

<http://andelasaric.com>

ORCID: 0000-0002-7854-2139



**Education:**

- 2009 – 2013 Ph.D. in Chemical Physics (*with distinction*), Columbia University, New York
- 2008 – 2009 M.A. in Chemical Physics, Columbia University, New York
- 2004 – 2008 Diploma in Chemistry (*summa cum laude*), University of Zagreb, Croatia

**Academic Appointments:**

- 01/2022 – Present Assistant Professor, Institute of Science and Technology, Austria
- 10/2019 – Present Associate Professor of Biological and Soft Matter Physics (tenured), UCL, UK
- 10/2017 – Present Royal Society University Research Fellow, UCL, UK
- 05/2016 – 10/2019 Junior Group Leader, University College London (first PI position), UK
- 10/2014 – 09/2017 Emmanuel College Research Fellow, University of Cambridge, UK
- 09/2013 – 11/2016 HFSP Cross-disciplinary Fellow, University of Cambridge, UK  
Advisor: Prof. Daan Frenkel
- 09/2009 - 06/2013 PhD student, Department of Chemistry, Columbia University, New York, USA  
Advisor: Prof. Angelo Cacciuto; Date of the award: 16/10/2013

**Career Breaks:**

- 05/2018 – 11/2018 birth of first child

**Grants and Awards:**

(Currently active ~£ 2.3 mil)

- American Biophysical Society Paper of the Year Award (San Francisco, 2022)
- Soft Matter Emerging Investigator (2021)
- ICREA Professorship 2021 (declined)
- EMBO Young Investigator Prize 01/2021-12/2025
- ERC Starting Grant 10/2019 - 09/2024 (PE3 Panel)  
“Non-equilibrium protein assembly: from building blocks to biological machines” (1.5 mil EUR, sole PI)
- Volkswagen Stiftung Life? Grant 01/2020 - 12/2023  
“The evolution of trafficking: from archaea to eukaryotes” (1.5 mil EUR, with 200k EUR as co-I)
- Royal Society University Research Fellowship 10/2017 - 09/2022 (£527k, sole PI)  
“Physics of protein organisation beyond the cell’s edge”  
+ an opportunity for a 3-years long extension in 2022
- Royal Society Research Grants for Research Fellows 10/2018 - 09/2022 (£97k, sole PI)  
“Physical mechanisms of membrane remodelling by active elastic filaments”
- Royal Society Research Fellows Enhancement Award 02/2018 - 01/2022 (£89k, sole PI)  
“Rational design of cell-reshaping elements”
- EPSRC First Grant 04/2018 - 04/2020 (£101k, sole PI)  
“Collagen assembly: from molecules to fibrils”
- Academy of Medical Sciences and Wellcome Trust Springboard Award 11/2017 - 04/2020 (£99k, sole PI)  
“Amyloid aggregation: Inhibition of self-replication and membrane-mediated control”
- EPSRC Collaborative Seed Grant 2016 (£15k, PI)  
“Biophysics of host-pathogen interactions”
- HFSP Cross-disciplinary Postdoctoral Fellowship (£98k, 2013 – 2016)
- Junior Research Fellowship, Emmanuel College, Cambridge (2014 – 2017)
- The Hammett Award for the best thesis in generation, Department of Chemistry, Columbia University (2013)
- Rutgers Fellowship for exemplifying academic excellence, Columbia University (2009)
- Rectors's Award, University of Zagreb (2008)

**Student and Postdoc mentoring:**

- 4 Postdocs (2 currently), 9 Phd students (7 currently), 9 masters students (1 currently), 2 Erasmus students

**Teaching Activities:**

- "Physical Models of Life", Department of Physics, University College London (2018 – 2021)
- "Computational approaches to biology", MRC LMCB, University College London (2021)
- "Advanced topics in biological physics", Department of Physics, University College London (2017)
- "Soft Matter", Supervisor, University of Cambridge (2013 – 2016)
- "Statistical Mechanics", Supervisor, University of Cambridge (2014 – 2016)
- Physical Chemistry, Tutor, Columbia University (2009 – 2013)
- Teaching assistant, Columbia University (2008 – 2010): "Thermodynamics and Statistical Mechanics" (2009, 2010), "General Chemistry" (2009, 2008)

**Publications:**Arising from independent laboratory:

49. L. Harker-Kirschneck, A. E. Hafner, ..., R. Henriques, B. Baum, **A. Šarić\***, *Physical mechanisms of ESCRT-III-driven cell division in archaea*, **Proc Natl Acad Sci U.S.A.** 119, e2107763119 (2022).
  48. A. Paraschiv, I. Palaia, V. Debets, C. Storm, **A. Šarić\***, *Durotaxis of passive nanoparticles on elastic membranes*, **ACS Nano** 15, 10, 15794–15802 (2021).
  47. A. Paraschiv, T. J. Lagny, E. Coudrier, C. V. Campos, P. Bassereau, **A. Šarić\***, *Influence of membrane-cortex linkers on the extrusion of membrane tubes*, **Biophys J** 120, 598 (2021).
  46. C. Vanhille-Campos and **A. Šarić\***, *Dynamics of vesicle shape changes under osmotic shocks*, **Soft Matter** 17, 3798, part of a themed collection "Emerging Investigators" (2021).
  45. L. Zeng, I. Palaia, **A. Šarić**, X. Su, *PLC $\gamma$ 1 promotes phase separation of the T cell signaling clusters*, **J. Cell. Biol.**, 220 (6), e202009154 (2021).
  44. L. K. Davis, **A. Šarić**, A. Zilman, B. Hoogenboom, *Physical modelling of multivalent interactions in the nuclear pore complex*, **Biophys J** 120, 1565 (2021).
  43. J. Krausser, T. P. J. Knowles, **A. Šarić\***, *Physical mechanisms of amyloid nucleation on fluid membranes*, **Proc Natl Acad Sci U.S.A.**, 117, 33090 (2020).
  42. J. Forster, J. Krausser, M. Vuyyuru, B. Baum, **A. Šarić\***, *Exploring the Design Rules for Efficient Membrane-Reshaping Nanostructures*, **Phys Rev Lett**, 125, 228101 (2020).
  41. A. Paraschiv, S. Hegde, R. Ganti, T. Pilizota, **A. Šarić\***, *Dynamic clustering regulates activity of mechanosensitive membrane channels*, **Phys Rev Lett**, 124, 048102 (2020).
- My team developed a model of a minimal mechanosensitive machine and explained how such machines self-organise and work cooperatively under osmotic gradients to regulate transduction between chemical and mechanical signals. Our model predictions were tested in *E. Coli*.
40. A. E. Hafner, N. G. Gyori, C. A. Bench, L. K. Davis, **A. Šarić\***, *Modelling fibrillogenesis of collagen mimetic molecules*, **Biophys J** 119, 1791 (2020). (On the Cover of Nov 3 issue; **Paper of the Year Award**).
  39. G. T. Risa, ..., **A. Šarić**, A. Lindas, N. Robinson, B. Baum, *The proteasome controls ESCRT-III-mediated cell division in an archaeon*, **Science**, 369, 6504 (2020).
  38. A.-K. Pfitzner, V. Mercier, X. Jian, J. M. von Filseck, B. Baum, **A. Šarić**, A. Roux, *Sequential polymerization of ESCRT subunits drives membrane deformation and fission*, **Cell** 182, 1140 (2020)
  37. V. Debets, L. M. C. Janssen, **A. Šarić\***, *Characterising the Diffusion of Biological Nanoparticles on Fluid and Elastic Membranes*, **Soft Matter**, 16, 10628 (2020).
  36. T. C. T. Michaels, **A. Šarić**, ..., S. Linse, T. P. J. Knowles, *Dynamics of oligomer populations formed during the aggregation of Alzheimer's A $\beta$ 42 peptide*, **Nature Chemistry** 12, 445 (2020). (On the cover).
  35. T. C. T. Michaels, **A. Šarić**, G. Meisl, G. T. Heller, S. Curk, P. Arosio, S. Linse, C. M. Dobson, M. Vendruscolo, T. P. J. Knowles, *Thermodynamic and kinetic design principles for protein aggregation inhibitors*, **Proc. Natl. Acad. Sci. U.S.A.**, 117, 24251 (2020).
  34. X. Tian, ..., **A. Šarić**, ..., G. Battaglia, *On the shuttling across the blood-brain barrier via tubules formation: mechanism and cargo avidity bias*, *in press*, **Science Advances**, 6, eabc4397 (2020).
  33. L. K. Davis, I. Ford, **A. Šarić\***, B. Hoogenboom, *Proteins gating the Nuclear Pore Complex exhibit ideal polymer behaviour*, **Phys Rev E** 101, 022420 (2020).
  32. A. J. Dear, G. Meisl, **A. Šarić**, T. C. T. Michaels, M. Kjaergaard, S. Linse, T. P. J. Knowles, *Identification of on- and off-pathway oligomers in amyloid fibril formation*, **Chem Sci**, DOI: 10.1039/c9sc06501f (2020).
  31. L. Harker-Kirschneck, B. Baum, **A. Šarić\***, *Transitions in filament geometry drive ESCRT-III-mediated membrane remodelling and fission*, **BMC Biology** 17, 1-8 (2019).

30. A. E. Hafner, J. Krausser, **A. Šarić\***, *Minimal coarse-grained models for molecular self-organisation in biology*, **Curr. Op. Struct. Biol.** 58, 43 (2019).
29. T. Curk, P. Wirnsberger, J. Dobnikar, D. Frenkel, **A. Šarić\***, *Controlling cargo trafficking in multicomponent membranes*, **Nano Lett** 18, 5350–5356 (2018). (On the cover).
28. T. Michaels, L. X. Liu, S. Curk, P. Bolhuis, **A. Šarić\***, T. P. J. Knowles, *Reaction rate theory for supramolecular kinetics: application to protein aggregation*, **Mol. Phys.**, 116, 3055-3065 (2018).
27. A. J. Dear, **A. Šarić\***, T. C. T. Michaels, C. M. Dobson, T. P. J. Knowles, *Statistical Mechanics of Globular Oligomer Formation by Protein Molecules*. **J. Phys. Chem. B** 122, 11721 (2018).
26. S. I. A. Cohen, R. Cukalevski, T. C. T. Michaels, **A. Šarić**, M. Vendruscolo, C. M. Dobson, A. K. Buell, T. P. J. Knowles, S. Linse, *Distinct thermodynamic signature of oligomer generation in the aggregation of the amyloid- $\beta$  peptide*, **Nature Chemistry** 10, 523(2018).
25. T. C. T. Michaels, **A. Šarić**, J. Habchi, S. Chia, G. Meisl, M. Vendruscolo, C. M. Dobson, T. P. J. Knowles, *Chemical Kinetics for Bridging Molecular Mechanisms and Macroscopic Measurements of Amyloid Fibril Formation*, **Annu. Rev. Phys. Chem** 69, 273 (2018).
24. P. D. E. Fisher, Q. Shen, B. Akpınar, L. K. Davis, K. K. H. Chung, D. Baddeley, **A. Šarić**, T. J. Melia, B. W. Hoogenboom, C. Lin, C. P. Lusk, *A Programmable DNA Origami Platform for Organizing Intrinsically Disordered Nucleoporins within Nanopore Confinement*, **ACS Nano** 12, 1502 (2018). (Highlighted on the UCL website.)
23. M. Simunovic, **A. Šarić**, J. M. Henderson, K. Y. C. Lee, G. A. Voth, *Long-Range Organization of Membrane-Curving Proteins*, **ACS Central Sci** 3, 1246 (2017).
22. S. C. J. Helle, Q. Feng, M. J. Aebersold, L. Hirt, R. R. Grüter, A. Vahid, A. Sirianni, S. Mostowy, J. G. Snedeker, **A. Šarić**, T. Idema, T. Zambelli, B. Kornmann, *Mechanical force induces mitochondrial fission*, **eLife** 6 (2017).
21. G. Meisl, L. Rajah I, S. I. A. Cohen, M. Pfammatter, **A. Šarić**, E. Hellstrand, A. K. Buell, A. Aguzzi, S. Linse, M. Vendruscolo, C. M. Dobson, T. P. J. Knowles, *Scaling behaviour and rate-determining steps in filamentous self-assembly*, **Chem. Sci.** 8, 7087 (2017).
20. A. Vahid, **A. Šarić**, T. Idema, *Curvature variation controls particle aggregation on fluid vesicles*, **Soft Matter** 13, 4924 (2017).

#### Arising from postdoc work:

19. P. Wirnsberger, D. Fijan, R. A. Lightwood, **A. Šarić**, C. Dellago, D. Frenkel, *Numerical evidence for thermally induced monopoles*, **Proc. Natl. Acad. Sci. U.S.A.** 114, 4911 (2017).
18. **A. Šarić\***, A. K. Buell, G. Meisl, T. C. T. Michaels, C. M. Dobson, S. Linse, T. P. J. Knowles, D. Frenkel, *Physical determinants of the self-replication of protein fibrils*, **Nature Physics** 12, 874 (2016). (Highlighted in the media, and the University of Cambridge and UCL research news).
17. **A. Šarić\***, T. C. T. Michaels, A. Zaccone, T. P. J. Knowles, D. Frenkel, *Kinetics of spontaneous filament nucleation via oligomers: insights from theory and simulations*, **J. Chem. Phys.** 145, 211926 (2016). (Cover paper of the special issue “Nucleation: New concepts and discoveries”. Highlighted in the AIP Research News)
16. S. J. Bachmann, J. Kotar, L. Parolini, **A. Šarić**, P. Cicuta, L. Di Michele, B. M. Mognetti, *Melting transition in lipid vesicles functionalised by mobile DNA linkers*, **Soft Matter** 12, 7804 (2016).
15. C. van der Wel, A. Vahid, **A. Šarić**, T. Idema, D. Heinrich, D. J. Kraft, *Lipid membrane-mediated attraction between curvature inducing object*, **Scientific Reports** 6, 32825 (2016).
14. P. Wirnsberger, D. Fijan, **A. Šarić**, M. Neumann, C. Dellago, D. Frenkel, *Non-equilibrium simulations of thermally induced electric fields in water*. **J. Chem. Phys.** 144, 224102 (2016).
13. **A. Šarić**, Y. C. Chebaro, T. P. J. Knowles, D. Frenkel, *Crucial role of non-specific interactions in amyloid nucleation*. **Proc. Natl. Acad. Sci. U.S.A.** 111, 17869 (2014). (Highlighted on the HFSP website).

#### Arising from PhD work:

12. S. A. Mallory, **A. Šarić**, C. Valeriani, A. Cacciuto, *Anomalous thermomechanical properties of fluids of self-propelled particles*. **Phys. Rev. E** 89, 052303 (2014).
11. B. M. Mognetti, **A. Šarić**, S. Angioletti-Uberti, A. Cacciuto, C. Valeriani, D. Frenkel, *Living clusters and crystals from low densities suspensions of active colloids*. **Phys. Rev. Lett.** 111, 245702 (2013). (Editor's suggestion, highlighted in P. Ball, **Physics** 6, 134 (2013)).
10. J. A. Napoli, **A. Šarić**, A. Cacciuto, *Collapsing nanoparticle-laden nanotubes*, **Soft Matter** 9, 8881 (2013).
9. **A. Šarić** and A. Cacciuto, *Self-assembly of nanoparticles on fluid and elastic membranes*, **Soft Matter** 9, 6677 (2013). (Review article)

8. A. Šarić and A. Cacciuto, *Mechanism of membrane tube formation induced by adhering nanocomponents*, **Phys. Rev. Lett.** 109, 188101 (2012). (Cover paper, highlighted in APS Physics Synopsis.)
7. A. Šarić and A. Cacciuto, *Fluid membranes can drive linear aggregation of adsorbed spherical nanoparticles*, **Phys. Rev. Lett.** 108, 118101 (2012). (Editor's suggestion.)
6. A. Šarić and A. Cacciuto, *Soft elastic surfaces as a platform for particle self-assembly*, **Soft Matter** 7, 7552 (2011).
5. A. Šarić and A. Cacciuto, *Particle self-assembly on soft elastic shells*, **Soft Matter** 7, 1874 (2011).
4. A. Šarić, B. Bozorgui, A. Cacciuto, *Packing of soft asymmetric dumbbells*, **J. Phys. Chem. B** 115, 7182 (2011). (On the cover of the special issue "Clusters in Complex Fluids".)
3. A. Šarić, J. C. Pàmies, A. Cacciuto, *Effective elasticity of a flexible filament bound to a deformable cylindrical surface*, **Phys. Rev. Lett.** 104, 226101 (2010).
2. A. Šarić, T. Hrenar, M. Mališ, N. Došlić, *Quantum mechanical study of secondary structure formation in protected dipeptides*, **Phys. Chem. Chem. Phys.** 12, 4678 (2010).
1. A. Šarić, V. Vrčec, M. Bühl, *Density Functional Study of Protonated Formylmetallocenes*, **Organometallics** 27, 394 (2008).

\* corresponding authorship; ‡ shared authorship

#### Invited presentations to international conferences:

- Telluride workshop "Condensed Phase Dynamics", Telluride, USA (2022)
- Biophysical Society Meeting, San Francisco, USA (2022)
- ESCRT Biology Meeting, Madison, USA (2022)
- EMBO Workshop "Mechanobiology in health and disease", Heidelberg, Germany (2022)
- Company of Biologists Workshop "From Physics to Function", Essex, UK (2022)
- GRC "Soft Matter", New England, USA (2021)
- Biophysical Society Meeting, Boston, now online (2021)
- TETHMEM Conference, Bonn, Germany (2021)
- EMBL Symposium: Life at the Periphery: Mechanobiology of the Cell Surface, now online (2021)
- EMBO Course: Current Methods in Cell Biology, Heidelberg (2021)
- EMBO Workshop on Designing Functional Biomolecular Assemblies, Bled, Slovenia (2020; now 2021)
- CECAM workshop: "Multiscale simulations of Soft Matter: new method developments and mathematical foundations", Mainz (2020)
- Telluride workshop "Condensed Phase Dynamics", Telluride, USA (2020)
- Physics & Biological Systems conference, Paris, France (2020; now 2021)
- Erice School on Computer Simulations, Erice, Italy (2020; now 2021)
- CECAM workshop "Challenges in Alzheimer's, Parkinson and Amyotrophic Lateral Sclerosis diseases from experimental to theoretical perspectives.", Paris, France (2020; now 2021)
- 4th Manchester Multiscale Conference, UK (2020; now 2021)
- NanoBio&Med2019 conference, Barcelona, Spain (2019)
- European Biophysical Society 10<sup>th</sup> IUPAP Biophysics congress, Madrid, Spain (2019)
- Computational Molecular Science Conference, Warwick, UK (2019)
- Finnish Physics Days, Helsinki, Finland (2019): Plenary talk
- Biotherapeutics and Vaccines Development Gordon Research Conference, Galveston, USA (2019)
- Bio-Mechanics workshop on cell membrane dynamics, micro-circulation and plasticity in tissues", Oslo, Norway (2018); declined due to childcare responsibilities
- BIOMS - Modelling and Simulation in the Biosciences, Heidelberg, Germany (2018)
- CCPBioSim: Molecular Simulations in Drug Discovery and Development, Oxford (2018)
- Workshop on Biological Membranes: Tiny Lipids with Grand Functions, Helsinki, Finland (2018)
- Telluride workshop on Condensed Phase Dynamics, Colorado, USA (2018): declined due to maternity leave
- From Solid State to Biophysics Conference, Dubrovnik, Croatia (2018): declined, maternity leave
- CECAM Workshop "Liquid Liquid Phase Separation in Cells", Lausanne, Switzerland (2018): declined, maternity leave
- Collective Dynamics and Self-organization in Biology, Edinburgh (2018): declined, maternity leave
- The Edwards Centre for Soft Matter Mini-symposium: Nucleation in clusters, Cambridge (2018)
- Filaments, Membranes, Cells – and their interactions" workshop, Juelich, Germany (2018)
- Physics of Living Matter Conference, Cambridge, UK (2017)
- Tethered Membrane Conference, Vienna, Austria (2017)
- Complex Systems Dynamics Meeting, Imperial College London (2017)
- APS March Meeting Invited Session: Biological Materials Self-Assembly, New Orleans, USA (2017)
- Computational Molecular Science Conference, Warwick, UK (2017)
- Biomaterials and their Interactions with Biological Membranes, Salou, Spain (2016)
- Royal Society Meeting on Nucleation, Chicheley Hall, UK (2016)

- Innovative Surfaces and Materials, Primosten, Croatia (2016)
- From Solid State to Biophysics, Dubrovnik, Croatia (2016)
- Recent Appointees in Materials Modelling Conference, London (2016)
- Gordon Conference “Soft Condensed Matter Physics” Seminar, New London, USA (2015)
- CECAM workshop “Understanding the interaction of nano-sized synthetic materials with biological membranes”, Lausanne, Switzerland (2014)

#### **Invited departmental visits and seminars:**

- Columbia University Department of Chemistry seminar (2022)
- Institute Pasteur Seminar (2022)
- University of Cambridge Department of Chemistry seminar (2022)
- University of Heidelberg Physics Seminar (2022)
- Cambridge Chemical Engineering Micromechanics Seminar (2021)
- Berkeley Statistical Mechanics seminar series, webinar (2021)
- NYU Soft Matter seminar series, webinar (2021)
- ICMS Annual Symposium, TU Eindhoven (2021)
- Barcelona Super Computing Centre seminar, webinar (2021)
- Goethe University of Frankfurt, DynaMem consortium, webinar (2020)
- MPI for Dynamics and Self-Organization, Göttingen, webinar (2020)
- Physics of Living Systems, EPFL (2019)
- Department of Biochemistry, University of Geneva (2019)
- Croatian Academy of Sciences, Zagreb, Croatia (2019)
- School of Chemistry Seminar, University of Birmingham (2019)
- Molecular and Nanoscale Physics Seminar, University of Leeds (2019)
- Bristol School of Mathematics (2019)
- Department of Physics, Lancaster (2019)
- Institute Curie Seminar, Paris, France (2019)
- Paris-Sud University, Physics-Biology Interface Seminar, Orsay, France (2019)
- Centre for Predictive Modelling Seminar, Warwick (2018)
- Chemical Engineering Seminar, University of Manchester (2018)
- Rovira i Virgili University, Multidisciplinary Seminar, Tarragona, Spain (2017)
- UCL Soft Matter Network, London (2017)
- Oxford University, Theoretical Chemistry Seminar, Oxford (2017)
- Thomas Young Centre Soiree, London (2017)
- TU Delft, Bionanoscience Department (2017)
- TU Eindhoven, Department of Applied Physics Soft Matter Seminar, Netherlands (2017)
- Kings College London, Department of Physics, UK (2016)
- University College London, LMCB, London (2016)
- Croatian Physical Society Seminar, Zagreb, Croatia (2015)
- BP Institute Seminar Series, University of Cambridge (2015)
- University of Dundee, The Division of Computational Biology (2015)
- Ludwig Maximilian University Munich, Department of Physics (2014)
- Brandeis Materials Research Science and Engineering Center Seminar, Boston, USA (2012)