Curriculum Vitae **Stéphanie P. Lacour**

1. Personal information

Address: Laboratory for Soft Bioelectronics Interfaces (LSBI)
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2. Education

10/2001 Ph.D. in Electrical Engineering, INSA de Lyon, France.
Laboratoire de Physique de la Matière (now INL). Supervisor: Prof. D. Barbier.
06/1998 M.S. in Integrated Electronic Devices, INSA de Lyon, France.
Laboratoire de Physique de la Matière (now INL). Supervisor: Prof. D. Barbier.
06/1998 M.S.E.E. in Microelectronics, INSA de Lyon, France.

3. Employment history

2022 - **Director;** Neuro-X Institute, EPFL, CH
2018 -2022 **Director;** Center for Neuroprosthetics, EPFL, CH
2022 - **Full Professor;** Neuro-X Institute, EPFL, CH
2017 - 2022 **Full Professor;** Institute of Electrical and Microengineering & Institute of Bioengineering, EPFL, CH
2016 **Associate Professor;** Institute of Microengineering & Institute of Bioengineering, EPFL, CH
2012-2021 Bertarelli Foundation Chair in Neuroprosthetic Technology, Center for Neuroprosthetics, EPFL
2011-2016 **Tenure Track Assistant Professor;** Inst. of Microengineering & Inst. of Bioengineering, EPFL, CH
2007-2012 **University Research Fellow of the Royal Society;** Head of the Stretchable BioElectronics group Department of Engineering, University of Cambridge, UK
2006-2009 Postdoctoral Project Manager, Department of Materials Science, University of Cambridge, UK
2001-2005 Postdoctoral Research Associate; Department of Electrical Engineering, Princeton University, USA
1998-2001 Doctoral Research Assistant; Laboratoire de Physique de la Matière (now INL), INSA de Lyon, FR

4. Institutional responsibilities

2021 – Member of the Strategic Committee of FCBG Fondation Campus Biotech Geneva / CH
2021 - Chair, Campus Committee for EPFL Associated campus in Geneva / CH
2018 – Coordinator (EPFL wide), EPFL Initiative in Neurotechnology, now called Neuro-X / CH
2018 – 2022 Member of the EPFL promotion committee (CEAE) / CH
2018 – 2022 Director of EPFL Centre for Neuroprosthetics / CH
2017 – 2022 Member of the steering committee, NCCR Robotics / CH
2015 – Faculty Advisor, Campus Biotech Neural Microsystem Platform / FCBG / CH
2016-2018 Member of the Scientific Board of EPFL Center for Micronanofabrication CMi
2012 – Member or chair, faculty search committee (x8), School of Engineering & School of Life Sciences, EPFL / CH

5. Supervision of Graduate Students and Postdoctoral Students

2011- 21 (10 current) PhD students, 21 (20 completed) master thesis students;
22 (4 current) postdoctoral scientists

6. Current EPFL Teaching activities

2022 - Lecturer, Neural Interfaces, Neuro-X master, 4th year (~70 st.) / EPFL
2022 - Co-Lecturer, Microfabrication technologies, Microengineering, 3rd year (~70 st.) / EPFL
2015 – Co-Lecturer, Doctoral Course, Soft Microsystems Processing and Devices / EPFL
2013 – 2022 Co-Lecturer, Electronique II, Electrical & Microengineering, 2nd year (~190 st.) / EPFL
2012 – 2022 Coordinator, Lab in Tube, Interdisciplinary Team project, 4th year (~3x3 st.) / EPFL
2012 – 2021 Lecturer, Flexible Bioelectronics, Engineering & Life sciences, 4th year (~70 st.) / EPFL

7. Memberships in panels, boards etc., and individual scientific reviewing activities (selected)

2023 - Member, Steering Committee, NeuroTech Harbor, NIH, John Hopkins University / USA
2022 Member, Evaluation Committee, new head of department, EMPA
2022 - Tenure Track Professor Mentoring committee, UT Munich, DE
2022 – Scientific Advisory Board, UK Dementia Research Institute, Imperial College London, U.K.
2021 – Scientific Advisory Board, Flagship Engineering Molecular Systems, Heidelberg Uni/ Germany
2017 – 2020 Editorial Board, nature Flexible Electronics
2014- Editorial Board, Extreme Mechanics Letters
2013 – Scientific Evaluation, Remote Reviewer, ERC Starting and Consolidator Grants
2005 – Reviewer, Journals including Science, Science Trans. Med., Science Advances, Nature, Nature Materials, Nature Nanotechnology, Advanced Materials, etc.

8. Memberships of scientific societies

2002 – Member, IEEE
2000 – Member, Materials Research Society

9. Organization of conferences (selected)

2022/2024 Co-Chair / Chair (1of 2), Gordon Research Conference in Neuroelectronics, U.S.A.
2019 Co-chair (1 of 5), 2019 Fall MRS Materials Research Society meeting / ~9'000 participants, U.S.A.
2012 Member of the Technical Program Committee, IEEE MEMS, Paris, France
Since 2006 Symposium co-organiser, Fall or Spring MRS Materials Research Society Meeting (except 2018 & 2020), Boston or San Francisco/Phoenix, U.S.A.

10. Keynotes, Fellowships and Awards (selected)

2023 Keynote speaker, IEEE FLEPS, Boston / USA
2023 Keynote speaker, IEMN, Lille / FR
2022 Keynote speaker, CAETS2022, Académie des Technologies, Versailles / FR
2020 1 of 4 shortlisted candidates for the 2020 IET AF Harvey Engineering Research Prize
2018 ERC POC Proof of Concept Grant (on soft neural implants)
2016 SNSF ERC Consolidator Grant (back-up scheme)
2016 ERC POC Proof of Concept Grant (on soft wearables)
2015 World Economic Forum 2015 Young Global Leader
2012 – Bertarelli Foundation Chair in Neuroprosthetic Technology, EPFL / Switzerland
2011 ERC Starting Grant
2011 Zonta Award, Switzerland
2007 – 2012 University Research Fellowship of the Royal Society, Dpt of Engineering, Univ. of Cambridge, U.K
09/2006 2006 TR35 Young Innovator, MIT Technology Review.

Major scientific achievements — Stéphanie P. Lacour

The laboratory for Soft Bioelectronic Interfaces directed by Prof. SP Lacour at EPFL, leads efforts to conceive, engineer and implement human-centric bioelectronics with body-like, tissue-like behavior. The long-term goal is to define and translate new classes of microfabricated devices that reliably integrate with their biological host to probe and deliver information with unmet stability, reliability and precision. Such technologies answer both needs in discovery and translational research. The research conducted by Prof. Lacour is intrinsically interdisciplinary and relies, since the start of her independent career, on symbiotic collaboration with experts from the neuroscience and medical disciplines. Her key collaborators (past 5 years) are G. Courtine (EPFL, neuroscience), J. Bloch (CHUV, neurosurgery), K. Schaller (HUG, neurosurgery), D. Lee (MEEI, USA, audition) & C. Woolf (HMS, USA, pain).

Prof. Lacour's team gathers experts from all engineering disciplines to develop the soft bioelectronic toolbox that combines guiding principles drawn from the topology and mechanics of host biological tissues with soft matter and advanced technologies inspired from thin-film electronics and additive manufacturing. Biomimetic in vitro multimodal characterization platforms and in vivo validation complete the pool of approaches deployed by the lab to advance, promote and translate soft bioelectronics towards clinical and therapeutic use. Recent scientific and technological achievements from her team lie in three main domains: (1) soft materials and associated technologies, (2) mechanical designs and neuro-integration, and (3) enabling devices for neuroscience discovery and translational research.

Soft Materials and Technology. Since the introduction of stretchable thin gold films, Prof. Lacour explores the engineering of stretchable conducting materials and hybrid circuits. She defines design guidelines and develops strategies to integrate stiff and brittle electrical and electronic materials and devices within soft and elastic carrier substrates. The designs are compatible with grown-on thin films, transfer-printed thin devices, thinned silicon dies and even packaged components. In the past decade, the team introduced three novel designs: (i) soft metallization based on thin biphasic Gallium films to enable conductors with metallic conductivity (0.5 Ω/sq), intrinsic elasticity (with up to 1 million strain cycles) and multilayered circuit layouts with 10 µm minimal feature size (Adv. Mat. 2016, Acc. Chem. Res. 2019, Ann. Rev. 2021); (ii) precise microstructuring of plastic-inorganics-plastic multilayers thereby enabling elasticity-by-design in initially brittle materials (Science Trans. Med. 2019), and (iii) hybrid organic-inorganic coating for hermetic encapsulation of stretchable bioelectronics (Small 2021). The technologies for soft materials developed in Prof. Lacour's lab are conceived anticipating both geometrical scaling and manufacturing scalability, two metrics, paramount to innovation translation (Adv. Mat. 2020, Neuron 2020).

Mechanical designs and neuro-integration. The mechanical mismatch between soft and dynamic neural tissues and today's stiff and static neural implants prevents long-term biointegration and advanced functionalities. Prof. Lacour's team pioneered soft bioelectronic implants that recapitulate the mechanical signature of the natural dura mater thereby offering man-made implants with high resilience and unprecedented biocompatibility within the nervous system (Adv. Mat. 2020a, Nature 2021, Adv. Science 2021). Microstructuring of plastic-thin films-plastic multilayers further embedded in soft elastomeric or hydrogel matrix is another biointegration route the lab is exploring to conform small, curved neural tissues such as the brainstem (Science Trans. Med 2019) and improve long-term integration within the cortex.

Soft implantable neural interfaces. Projects in the team are driven by translational research and neuroprosthetic medicine, and address conditions such as impaired hearing (Science Trans. Med. 2019), chronic pain (Nat. Biotech 2021a) and paralysis (Nature 2021). The team introduced a conceptual framework to promote the translation of soft neurotechnology (Adv. Mat. 2020b), a much-needed concept to reliably advance the next generation of microfabricated medical implants. The team now develops strategies based on hybrid integration to manufacture multimodal implants, i.e. capable of delivering optical (Nat. Biotech 2021a, Nat. Biotech 2021b), chemical and electrical stimulation (STM 2019), and record neural information (Adv. Science 2021).

Mentoring and training in the past 5 years: since 2016, Prof. Lacour trained > 6 students with a master thesis, mentored 19 (10 current) doctoral students, and advised 14 (4 current) postdoctoral scientists. Of note, three MSc students are completing a doctorate at EPFL-CHUV (MD-PhD), Harvard and MIT, one doctoral student spun in 2020 the start-up Neurosoft Bioelectronics SA from the lab, 3 former postdoctoral scientists hold education or research scientist positions in national labs (1 USA, 1 UK, 1 France), and 7 former postdoctoral scientists hold assistant to full professorships worldwide (1 India, 1 China, 1 UK, 1 the Netherland, 1 Norway, 2 USA).

Key References from the past 5 years. ([R] review, * equal contribution)

S. Song, F: Fallegger, A. Trouillet, K. Kim, **S.P. Lacour.** Deployable electrocorticography (ECoG) system assisted with soft robotic actuation. **2023.** ***Science Robotics***. *Accepted*.

M. Shur, O. Akouissi, O. Rizzo, D.J. Colin, J. Kolinski, **S.P. Lacour.** Revealing the complexity of ultra-soft hydrogel re-swelling inside the brain. **2023.** ***Biomaterials***. 294, 122024.

C. Kathe, M.A. Skinnider, T.H. Hudson, N. Regazzi, M. gautier, R. Demesmaeker, S. Komi, S. Ceto, N.D. James, N. Cho, L. Baud, K. Galan, K.J.E. Matson, A. Rowald, K. Kim, R. Wang, K. Minassian, J.O. Prior, L. Asboth, Q. Barraud, **S.P. Lacour,** A.J. Levine, F. Wagner, J. Bloch*, J.W. Sqair*, G. Courtine*. The neurons that restore walking after paralysis. **2022.** ***Nature***. 611, 540-547.

M. Mariello, K. Wu, K. Kim, **S.P. Lacour**[*], Y. Leterrier[*]. Recent advances in encapsulations of flexible bioelectronic implants: materials, technologies and characterization methods. **2022**. ***Advanced Materials***. 2201129

C. Kathe*, F. Michoud*, Ph. Schönle*, A. Rowald, N. Brun, J. Ravier, I. Furfaro, V. Paggi, K. Kim, S. Soloukey, L. Asboth, T.H. Hutson, I. Jelescu, A. Philippides, N. Alwahab, J. Gandar, D. Huber, C.I. De Zeeuw, Q. Barraud, Q. Huang, **S.P. Lacour***, G. Courtine*. **2021.** Wireless closed-loop optogenetics across the entire dorsoventral spinal cord in mice. ***Nature Biotechnology***. 4(2) 198-208.

K. Kim, M. Van Gompel, K. Wu, G. Schiavone, J. Carron, F. Bourgeois, **S.P. Lacour***, Yves Leterrier*. **2021**. Extended Barrier Lifetime of Partially Cracked Organic/Inorganic Multilayers for Compliant Implantable Electronics. ***Small***, 2103039.

F. Fallegger, G. Schiavone, E. Pirondini, F.B. Wagner, N. Vachicouras, L. Serex, G. Zegarek, A. May, P. Constanthin, M. Palma, M. Khoshnevis, D. Van Roost, B. Yvert, G. Courtine, K. Schaller, J. Bloch, **S.P. Lacour**. **2021**.MRI-Compatible and Conformal Electrocorticography Grids for Translational Research. ***Advanced Science***. 2003761.

J.W. Squair, M. Gautier*, L. Mahe*, J.E. Soriano*, A. Rowald*, A. Bichat, N. Cho, M.A. Anderson, N.D. James, J. Gandar, A.V. Incognito, G. Schiavone, Z.K. Sarafis, A. Laskaratos, K. Bartholdi, R. Demesmaeker, S. Komi, C Moerman, B. Vaseghi, B. Scott, R. Rosentreter, F. Fallegger, I. Jelescu, Y. Cheng, L. Qin, R. Buschman, N. Buse, T. Denison, S. Dukelow, R. Charbonneau, I. Rigby, S.K. Boyd, Ph.J. Milar, E. Martin Moraud, M. Capogrosso, F.B. Wagner, Q. Barraud, E. Bezard, **S.P. Lacour**, J. Bloch, G. Courtine*, A.A. Phillips*. **2021**. Neuroprosthetic baroreflex controls hemodynamics after spinal cord injury. ***Nature***. 590, 308-314.

F. Michoud*, C. Seehus*, Ph. Schönle*, N. Brun, D. Taub, Z. Zhang, A. Jain, I. Furfaro, O. Akouissi, R. Moon, P. Meier, K. Galan, B. Doyle, M. Tetreault, S. Talbot, L.E. Browne, Q. Huang*, C.J. Woolf*, **S.P. Lacour***. Epineural optogenetic activation of nociceptors initiates and amplifies inflammation. **2021**. ***Nature Biotechnology*****. 39, 179-185.**

G. Schiavone, F. Fallegger, X. Kang, B. Barra, N. Vachicouras, E. Roussinova, I. Furfaro, S. Jiguet, I. Seañez, S. Borgognon, A. Rowald, Q. Li, C. Qin, E. Bézard, J. Bloch, G. Courtine, M. Capogrosso, **S.P. Lacour**. Bioelectronic Interfaces: Soft, Implantable Bioelectronic Interfaces for Translational Research. **2020**. ***Advanced Materials***. 32(17), 2070133.

G. Schiavone*, X. Kang*, F. Fallegger, J. Gandar, G. Courtine, **S.P. Lacour**. Guidelines to Study and Develop Soft Electrode Systems for Neural Stimulation. **2020**. ***Neuron***, 108(2), 238-258.

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