Exponent®
Engineering & Scientific Consulting

Josh Buser, Ph.D.

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Professional Profile

Joshua R. Buser, Ph.D., is a technical consultant at Exponent with over 20 years of experience at the interface of science and engineering, with expertise including microfluidics design, prototyping, manufacturing, precision thermal control for bioassays, and hands-on design, fabrication, troubleshooting, and repair of electromechanical systems.

He’s developed a particular focus on systems integration for portable diagnostic bioassay platforms and early-stage product development across life sciences and medical diagnostics.

Dr. Buser specializes in medical diagnostic device development, microfluidic system design, and manufacturing scale-up, providing expert analysis and consulting for life science companies and academic institutions. His work encompasses hardware/bioassay integration, microfluidics development and manufacturing, systems engineering for medical diagnostics platforms, and temperature control, with a particular expertise in point-of-care diagnostic platforms for low-resource settings.

Serving clients in the in vitro diagnostics (IVD) industry along with academic and clinical researchers, Dr. Buser addresses challenges including fluidic device failure modes and manufacturing scale-up of complex multilayer microfluidic assemblies. His consulting experience spans sample preparation, precision thermal management for biochemical reactions, and transitioning prototypes from early-stage to manufacturing environments.

Dr. Buser's approach integrates first-principles engineering, hands-on fabrication, computational modeling, and laboratory validation to deliver rigorous and practical solutions. He brings deep expertise in microfluidics, fluidic and thermal modeling, sample preparation, and bioassay/fluidics/electromechanical hardware integration, with his fluency across mechanical and bioengineering, systems integration, and electromechanical domains enabling cross-functional collaboration.

Before joining Exponent, Dr. Buser served as the head of a small R&D firm in Philadelphia with projects including a complete redesign of a disposable microfluidic product and development of novel non-electric heaters for isothermal amplification using exothermic reactions and phase change temperature control. Prior to that he was the VP of R&D at Chip Diagnostics, where he led development of an extracellular vesicle sample preparation system, building a pilot supply chain enabling clinical research projects led by the University of Pennsylvania. As a postdoctoral researcher and Ph.D. student at the University of Washington, he advanced the scientific understanding of partially saturated flow in porous media and created next-generation portable diagnostic systems. Dr. Buser earned his Ph.D. in Bioengineering from the University of Washington and his B.S. in Mechanical Engineering from the University of Wisconsin–Madison.

Academic Credentials & Professional Honors

Ph.D., Bioengineering, University of Washington, 2016

B.S., Mechanical Engineering, University of Wisconsin, Madison, 2006

Prior Experience

Principal, Consonant Systems, Philadelphia, PA, 2016-2026

Consultant, Vectis Solutions, Boston, MA (remote), 2022-2026

Lead – Device Integration, Domus Diagnostics, Salt Lake City, UT (Remote), 2021–2025

Vice President – Research & Development, Chip Diagnostics, Philadelphia, PA, 2018–2023

Postdoctoral Researcher & Ph.D. Student, University of Washington, Seattle, WA, 2011–2018

Senior Research Assistant, Oregon Health and Science University, Portland, OR, 2008–2011

Design Engineer, Allied Systems Company – Long Reach Division, Sherwood, OR, 2007–2008

Field Sales Engineer, Danaher Motion, North America, 2006–2007

Project Engineer Intern, Grede Foundries – Liberty Division, Wauwatosa, WI, 2001 & 2004

Automotive Mechanic, M&R Service Center, Cedar Grove, WI, 2000-2001

Patents

US12528082B2: Lateral flow-based systems and methods, January 20, 2026 (JR Buser, JD Bishop, D Guelig, A Howell, S Kumar, P Yager, K Abe, EK Heiniger, SA Byrnes, CE Anderson, PC Kauffman, M Wheeler)

US11098346B2: Sequential delivery of fluid volumes and associated devices, systems and methods, August 24, 2021 (J Bishop, J Buser, S Byrnes, S Dharmaraja, ES Fu, J Houghtaling, PC Kauffman, S Kumar, L Lafleur, T Liang, B Lutz, B Toley, M Wheeler, P Yager, X Zhang)

Publications

SJ Yang, AA Lin, H Shen, LW Pappalardo, GB Spychalski, J Rosario, LK Forsberg, KM Grant, JR Buser, R Savica, S O'Bryant, DT Jones, DW Dickson, RR Reichard, AT Nguyen, DF Meaney, BF Boeve, OA Ross, PJ McLean, D Issadore. "Microfluidic nanomagnetically isolated neuron- and astrocyte-derived extracellular vesicles to differentiate Lewy body and Alzheimer's disease," NPJ Biosensing, 2026, 3(19).

AR Hanna, SJ Shepherd, GA Datto, R El-Mayta, T Anderson, IB Navarro, AS Ricciardi, MS Padilla, N Srikumar, S Zhang, HM Yamagata, NY Meng, JR Buser, M-G Alameh, MJ Mitchell, DA Issadore. "Automated and Parallelized Microfluidic Generation of Large and Precisely Defined Lipid Nanoparticle Libraries," ACS Nano, 2026, 20(1), 772–789. DOI: 10.1021/acsnano.5c15613

KG Shah, M Roller, S Kumar, S Bennett, E Heiniger, K Looney, JR Buser, JD Bishop, P Yager. "Disposable platform for bacterial lysis and nucleic acid amplification based on a single USB-powered printed circuit board," PLoS One, 2023, 18(4), e0284424. DOI: 10.1371/journal.pone.0284424

S Kumar, R Gallagher, JD Bishop, E Kline, JR Buser, LK Lafleur, K Shah, BR Lutz, P Yager. "Long-term dry storage of enzyme-based reagents for isothermal nucleic acid amplification in a porous matrix for use

in point-of-care diagnostic devices," Analyst, 2020, 145(21), 6875–6886. DOI: 10.1039/d0an01098g

V Yelleswarapu, JR Buser, M Haber, J Baron, E Inapuri, D Issadore. "Mobile platform for rapid sub-picogram-per-milliliter, multiplexed, digital droplet detection of proteins," PNAS, 2019, 116(10), 4489–4495. DOI: 10.1073/pnas.1814110116

CE Anderson, JR Buser, AM Fleming, EM Strauch, PD Ladd, J Englund, D Baker, P Yager. "An integrated device for the rapid and sensitive detection of the influenza hemagglutinin," Lab on a Chip, 2019, 19(5), 885–896.

JR Buser, SA Byrnes, et al. "Understanding partial saturation in paper microfluidics enables alternative device architectures," Analytical Methods, 2019, 11(3), 336–345.

JP Esquivel, JR Buser, CW Lim, S Rojas, P Yager, N Sabate. "Single-use paper-based hydrogen fuel cells for point-of-care diagnostic applications," Journal of Power Sources, 2017, 342, 442–451. DOI: 10.1016/j.jpowsour.2016.12.085

LK Lafleur, JD Bishop, EK Heiniger, et al. "A rapid, instrument-free, sample-to-result nucleic acid amplification test," Lab on a Chip, 2016, 16(19), 3777–3787.

EK Heiniger, JR Buser, L Mireles, et al. "Comparison of point-of-care-compatible lysis methods for bacteria and viruses," Journal of Microbiological Methods, 2016, 128, 80–87. DOI: 10.1016/j.mimet.2016.07.007

JR Buser, X Zhang, SA Byrnes, et al. "A disposable chemical heater and dry enzyme preparation for lysis and extraction of DNA and RNA from microorganisms," Analytical Methods, 2016, 8, 2880–2886. DOI: 10.1039/C6AY00107F

JR Buser, S Diesburg, et al. "Precision chemical heating for diagnostic devices," Lab on a Chip, 2015, 15(23), 4423–4432. DOI: 10.1039/c5lc01053e

JR Buser, A Wollen, EK Heiniger, et al. "Electromechanical cell lysis using a portable audio device," Lab on a Chip, 2015, 15(9), 1994–1997. DOI: 10.1039/C5LC00080G

BJ Toley, JA Wang, M Gupta, JR Buser, et al. "A versatile valving toolkit for automating fluidic operations in paper microfluidic devices," Lab on a Chip, 2015, 15(6), 1432–1444. DOI: 10.1039/c4lc01155d

SA Byrnes, JD Bishop, L Lafleur, JR Buser, et al. "One-step purification and concentration of DNA in porous membranes for point-of-care applications," Lab on a Chip, 2015, 15(12), 2647–2659. DOI: 10.1039/C5LC00317B

KG Shah, D Guelig, S Diesburg, JR Buser, et al. "Design of a New Type of Compact Chemical Heater for Isothermal Nucleic Acid Amplification," PLoS One, 2015, 10(10), e0139449. DOI: 10.1371/journal.pone.0139449

JR Buser, J Maire, A Riddle, et al. "Arrested preoligodendrocyte maturation contributes to myelination failure in premature infants," Annals of Neurology, 2012, 71, 93–103. DOI: 10.1002/ana.22627

N Uchida, K Chen, M Dohse, KD Hansen, J Dean, JR Buser, et al. "Human neural stem cells induce functional myelination in mice with severe dysmyelination," Science Translational Medicine, 2012, 4(155). DOI: 10.1126/scitranslmed.3004371

A Riddle, J Dean, JR Buser, et al. "Histopathological correlates of MRI-defined chronic perinatal white matter injury," Annals of Neurology, 2011, 70(3), 493–507. DOI: 10.1002/ana.22501

JR Buser, KN Segovia, JM Dean, et al. "Timing of appearance of late oligodendrocyte progenitors

coincides with enhanced susceptibility of preterm rabbit cerebral white matter to hypoxia-ischemia," Journal of Cerebral Blood Flow and Metabolism, 2010, 30(5), 1053–1065. DOI: 10.1038/jcbfm.2009.286

Presentations

JR Buser, JE Atwood, P Yager. Poster Presentation, MicroTAS, 2016.

SA Byrnes, JR Buser, P Yager. Poster Presentation, MicroTAS, 2016.

CE Anderson, JR Buser, P Yager. Poster Presentation, MicroTAS, 2016.

BR Lutz, P Yager, E Fu, JR Buser, et al. Workshop, MicroTAS, 2016.

JR Buser, EK Heiniger, L Mireles, et al. Poster Presentation, Gordon Research Conference, 2015.

SP Diesburg, JR Buser, et al. Poster Presentation, Gordon Research Conference, 2015.

JR Buser, SP Diesburg, et al. Poster Presentation, Gordon Research Conference, 2015.

SA Byrnes, JR Buser, et al. Poster Presentation, MicroTAS, 2015.

J Singleton, D Guelig, JR Buser, et al. Poster Presentation, IEEE GHTC, 2014.

SA Byrnes, JD Bishop, LK Lafleur, JR Buser, et al. Poster Presentation, MicroTAS, 2014.

SA Byrnes, JD Bishop, LK Lafleur, JR Buser, et al. Oral Presentation, BMES, 2014.

J Singleton, D Guelig, JR Buser, et al. Poster Presentation, Clinical Chemistry Oakridge, 2014.

JR Buser, G Kimpel, PC Kauffman, BJ Toley, P Yager. Poster Presentation, Gordon Research Conference, 2013.

J Yang, JR Buser, E Fu. Poster Presentation, BMES, 2013.

JR Buser, SA Byrnes, GE Fridley. Workshop Demonstration, Microfluidics 2.0, Boston University, 2012.

JR Buser, G Kimpel, PC Kauffman, E Fu, BR Lutz, P Yager. Poster Presentation, BMES, 2012.

Peer Reviews

Reviewer for Lab on a Chip

Analytical Chemistry

Langmuir

PNAS

Small

Analytical Methods