



Exponent®

Engineering & Scientific Consulting

## Kent Coombs, Ph.D.

Senior Scientist | Biomedical Engineering and Sciences

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### Professional Profile

Dr. Coombs specializes in cellular biology, materials science, in vitro diagnostics, the assessment of the interface between biology and materials, and microbiology. Trained in Biomedical Sciences, he has interdisciplinary expertise in cellular biology, materials science, bioengineering, and microbiology.

As a bioengineer, he designed and developed organ-on-a-chip/organ bioreactor technologies and optimized them for human tissue growth and in vitro assays. Dr. Coombs specializes in materials selection, synthesis, characterization, and modification in order to promote optimal biological activity of primary cells on novel polymer substrates. He can also characterize materials using techniques like goniometry, tensile and elongation, rheology, hydrogel sol/swell, biocompatibility, fluorescence/ confocal microscopy, scanning electron microscopy (SEM), atomic force microscopy (AFM), nuclear magnetic resonance (NMR), and gel permeation chromatography (GPC). In addition, he has experience investigating cellular biology using quantitative polymerase chain reaction (qPCR), immunofluorescence (IF), flow cytometry (FCM), radiological isotope exposure studies, apoptosis assays, in vitro toxicology testing, and metabolic profiles.

Dr. Coombs can help clients in device and substrate design, material testing, and assay development from both a materials and biological standpoint. This includes but is not limited to manufacturing, material surface modifications, biocompatibility testing, and mechanical testing. He can also advise on the choice and development of biological assays, cell sourcing, and investigations of cellular behavior in novel cell culture environments or assays.

Prior to joining Exponent, he completed a post-doctoral position at Los Alamos National Laboratory (LANL). His work involved the design, manufacturing, and testing of organ chips and bioreactors, which captured complex mechanical cues found in human organs. These organ chips were developed to increase the reliability and predictive value of in vitro assays using primary human cells and induced pluripotent stem cell-derived (iPSC) cardiomyocytes compared to tradition cell culture methods. His work also helped to investigate radiotherapeutic treatments designed to target antibiotic resistant bacterial infections. As a University of California/Los Alamos National Laboratory Entrepreneurial Postdoctoral Fellow he received training in technology transfer practices and how it can be applied to federal laboratory technologies to create products for the private market.

### Academic Credentials & Professional Honors

Ph.D., BIOMEDICAL SCIENCE, University of New Mexico, 2018

B.A., Biology, Hendrix College, 2010

## Prior Experience

Postdoctoral Researcher, Los Alamos National Laboratory, 2018-2021

Graduate Researcher, University of New Mexico 2011-2017

Post Baccalaureate Researcher, Los Alamos National Laboratory, 2010-2011

## Professional Affiliations

Biomedical Engineering Society (BMES)

## Publications

Rush MN, Coombs KE, Denny CT, Santistevan D, Huynh QM, Cicotte KN, Hedberg-Dirk EL. Acid Scavenger Free Synthesis of Oligo(Poly(Ethylene Glycol) Fumarate) Utilizing Inert Gas Sparging. *Tissue Eng Part C Methods*. 2021 May;27(5):296-306. doi: 10.1089/ten.TEC.2021.0027. PMID: 33765836; PMCID: PMC8147510.

Lillo AM, Velappan N, Kelliher JM, Watts AJ, Merriman SP, Vuyisich G, Lilley LM, Coombs KE, Mastren T, Teshima M, Stein BW, Wagner GL, Iyer S, Bradbury ARM, Harris JF, Dichosa AE, Kozimor SA. Development of Anti-Yersinia pestis Human Antibodies with Features Required for Diagnostic and Therapeutic Applications. *Immunotargets Ther*. 2020 Nov 27;9:299-316. doi: 10.2147/ITT.S267077. PMID: 33294421; PMCID: PMC7716875.

Coombs KE, Leonard AT, Rush MN, Santistevan DA, Hedberg-Dirk EL. Isolated effect of material stiffness on valvular interstitial cell differentiation. *J Biomed Mater Res A*. 2017 Jan;105(1):51-61. doi: 10.1002/jbm.a.35864. Epub 2016 Aug 24. PMID: 27513612.

Rush MN, Coombs KE, Hedberg-Dirk EL. Surface chemistry regulates valvular interstitial cell differentiation in vitro. *Acta Biomater*. 2015 Dec;28:76-85. doi: 10.1016/j.actbio.2015.09.031. Epub 2015 Sep 30. PMID: 26428193; PMCID: PMC4648670.

## Presentations

Coombs K.E.. "Hertz Bio. A Benchtop Miniature Beating Heart" Innovate New Mexico, Albuquerque, NM, Presentation, 2020

Coombs K.E. "A Miniature Human Heart" Los Alamos National Labs DisrupTECH, Los Alamos, NM, Presentation, (Best Pitch Award) 2019

Coombs K.E, Alipio-Lyon E., Ishak M., Purcell D., Pulak N., Rashi I., Harris J.F., "Addressing Application Specific Engineering Challenges to Mimic Micro-physiological Features – A Perspective on the Next Generation of Lung- and Heart-on-a-Chip Platforms," CBD S&T, Cincinnati, OH, Presentation, 2019

Coombs K.E., Leonard A., Rush M.N., Santistevan D., Hedberg-Dirk E.L. "Novel Synthesis of Oligo Polyethelyene Glycol Fumarate Biodegradable Hydrogels" Tissue Engineering International & Regenerative Medicine Society. San Diego, CA, Presentation, 2016

Coombs K.E., Rush M.N., Dirk, E.L., Rush M.N., Leonard A. "Isolating the Effect of Stiffness on Valvular Interstitial Cells and its Role in Phenotype Control," Society for Biomaterials Annual meeting and Exposition, Presentation, Charlotte, NC, 2015