

Ryan R. Hansen

Postdoctoral Research Associate
Nanofabrication Research Laboratory
Center for Nanophase Materials Sciences
(865) 576-8166
hansenrr@ornl.gov



Education

University of Colorado, Boulder, CO Chemical and Biological Engineering Ph.D., 2008
Colorado School of Mines, Golden, CO Chemical Engineering B.Sc. Hons, 2001

Professional Experience

2012-present Postdoctoral Research Associate, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
2009-2012 American Heart Postdoctoral Research Associate, Department of Chemical and Biological Engineering, Colorado School of Mines; Department of Pediatrics, University of Colorado Anschutz Medical Campus
2003-2008 Graduate Research Associate, Department of Chemical and Biological Engineering, University of Colorado, Boulder
2001-2003 Associate Engineer, Parsons Corporation, Denver, CO

Professional and Synergistic Activities

2005-2012 Member, American Chemical Society (ACS)
2005 Teaching Assistant, Materials and Energy Balances, University of Colorado
2003 Teaching Assistant, Chemistry for Engineers, University of Colorado

Honors and Awards

2010-2012 American Heart Association Post Doctoral Fellow
2005 – 2008 Teets Family Endowed Doctoral Fellowship in Nanotechnology
2004 – 2008 Graduate Assistantship in Areas of National Need Fellowship
2007 First place poster award, American Association of Cancer Research at the Molecular Diagnostics in Cancer Therapeutic Development Conference
2005 Best oral presentation, annual graduate student research symposium, University of Colorado
2003 Best first-year research poster presentation, University of Colorado
2001 Fundamentals in Engineering License, Colorado

Publications

Full publication list follows CV.

Research Synopsis

1. High-content microfluidics for functional profiling of microbial communities

Microfluidics is an ideal approach for manipulating and analyzing microbial communities. We are currently developing a microfluidic platform capable of functional profiling of microbial communities based on chemotactic motility and exopolysaccharide expression. Such a device will be used to isolate microbes from complex communities for bioinformatics applications.

2. Nanoscale systems for investigation of protein unfolding dynamics

Von Willebrand Factor (VWF) is a plasma protein that plays a crucial role in promoting platelet adhesion to the vascular wall during thrombosis. VWF morphology and activity are dependent on flow conditions and the conformation of the binding surface. Using e-beam lithography, we are developing microfluidic substrates with nano-scale patterns of VWF-capture ligands for investigation of the role of binding site density and spacing with VWF morphology and activity under flow.

3. Fabrication of biofunctionalized substrates using nano-patterned surface chemistries

Substrates containing chemical patterns at the micro to nano-scale can be used as templates for directing protein adsorption, cellular adhesion, and material assembly. We are developing novel surface chemistries and nanofabrication approaches optimized for these applications.

Graduate and Postdoctoral Advisors

Postdoctoral Advisor : Scott Retterer, Oak Ridge National Laboratory

Postdoctoral Advisor : Keith Neeves, Colorado School of Mines

Graduate Advisor : Christopher Bowman, University of Colorado, Boulder

Ryan R. Hansen, Ph.D.

Center for Nanophase Materials Sciences Division
Oak Ridge National Laboratory
Oak Ridge, TN 37831
hansenrr@ornl.gov

PUBLICATIONS

1. R.R. Hansen, A.R. Wufsus, S. Barton, R.M. Johnson-Paben, A.A. Onasoga, and K.B. Neeves, "High-Content Evaluation of Platelet Function Using the Microfluidic Flow Assay," *Annals of Biomedical Engineering*, in press.
2. K.B. Neeves, A.A. Onasoga, R.R. Hansen, J.J. Lilly, D. Venckunaite, M.B. Sumner, A.T. Irish, G. Brodsky, M. J. Manco-Johnson, and J.A. Di Paola, "Sources of Variability in Platelet Accumulation on Type I Fibrillar Collagen In Microfluidic Flow Assays," *PLOS ONE*, in press.
3. R.R. Hansen, A.A. Tipnis, T.C. White-Adams, J.A. Di Paola, and K.B. Neeves, "Characterization of Collagen Thin Films for Platelet Adhesion and von Willebrand Factor Binding," *Langmuir*, **27**, 13648-13658 (2011).
4. L.M. Johnson, R.R. Hansen, M. Urban, R.D. Kuchta, and C.N. Bowman, "Photoinitiator Nucleotide for Quantifying Nucleic Acid Hybridization," *Biomacromolecules*, **11**, 1133-1138 (2010).
5. R.R. Hansen, L.M. Johnson, and C.N. Bowman, "Visual Detection of Nucleic Acid Biomarkers Using Polymerization-Based Amplification," *Analytical Biochemistry*, **386**, 285-287 (2009).
6. L.M. Johnson, H.J. Avens, R.R. Hansen, H.L. Sewell, and C.N. Bowman, "Characterization of the Assaying Methods in Polymerization-Based Amplification of Surface Biomarkers," *Australian Journal of Chemistry*, **62**, 877-884 (2009).
7. R.R. Hansen, H.J. Avens, R. Shenoy, and C.N. Bowman, "Quantitative Evaluation of Oligonucleotide Surface Concentrations Using Polymerization-Based Amplification," *Analytical and Bioanalytical Chemistry*, **392**, 167-175 (2008).
8. R.R. Hansen, H.D. Sikes, and C.N. Bowman, "Visual Detection of Labeled Oligonucleotides Using Visible Light Polymerization-Based Amplification," *Biomacromolecules*, **9**, 355-362 (2008).
9. H. D. Sikes, R. R. Hansen, L. M. Johnson, R. Jenison, J. W. Birks, K. L. Rowlen, and C. N. Bowman, "Using Polymeric Materials to Generate an Amplified Response to Molecular Recognition Events," *Nature Materials*, **7**, 52-56 (2008).

PATENTS

1. C.N. Bowman, H.D. Sikes, K. Rowlen, H. Avens, and R. Hansen, "Use of Photopolymerization for Amplification and Detection of a Molecular Recognition Event", US Pat. No. 7,354,706 B2, April 8, 2008.

FUNDING OBTAINED

1. *Microfluidic Flow Assays for Measuring Clinical Bleeding Potential*, Colorado Bioscience Discovery Evaluation Grant Program, 9/15/11-8/31/12, \$72,841, (co-PI with K.B. Neeves)
2. *Microfluidic Flow Assays for Diagnosing Bleeding and Thrombotic Disorders*, Colorado Bioscience Discovery Evaluation Grant Program, 3/1/10-3/31/11, \$86,121 (co-PI with K.B. Neeves)
3. *Characterization of Shear-specific Biomarkers for von Willebrand Disease Using Microfluidic Devices*, American Heart Association Postdoctoral Fellowship, SouthWest Affiliate 10POST4040041, 7/1/10-6/30/12, \$85,972 (PI)
4. *High Amplification Detection of Genetic Cancer Markers*, NIH 1R21 CA127884-01A1 Grant, 1/1/08-12/31/09, \$305,460 (co-authored with C.N. Bowman (PI))