



Derek Hansford, Ph.D., Associate Professor

Education

Ph.D., University of California-Berkeley, 1999

Professional Experience

Dr. Hansford has worked on the materials science issues in microdevices during his undergraduate (MSE, CWRU 1994) and graduate (MSME, UC Berkeley 1999) education, and continues to investigate novel processing methods for microfabricating biomedical microdevices at OSU.

Dr. Hansford plays an active role in the Ohio MicroMD Laboratory (www.micromd.org) as the Chief Scientist of Microfabrication, assisting the staff in qualifying processes and developing new processes based on biocompatible materials.



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Affiliations

Chief Scientist, Microfabrication, Ohio MicroMD Laboratory

Joint faculty member with Biomedical Engineering and the Biophysics graduate program at OSU

Research Interests

From theoretical biofluid flow modeling through nanochannels to novel microfabrication protocol development for biomedical microdevices and conducting polymer circuitry.

The recent research has focused on the microfabrication of polymers to produce microdevice drug delivery systems and nanochannels for the controlled motion of biomolecules in solution. This research involves controlling the processing parameters to improve adhesion, stress states, and thermal stability of deposited

films, as well as methods of selectively removing or placing the films. Design of devices allow the incorporation of many different functions in the extremely limited real estate of microdevices.

Recent publications

(from 25 journal articles and over 45 proceedings)

D Gallego, N Higueta, F Garcia, N Ferrell, and DJ Hansford, "Bioactive coatings on Portland cement substrates: Surface precipitation of Apatite-like crystals," *Materials Science and Engineering C*, in press, available online April 14, 2007.

D Gallego, N Ferrell, Y Sun, and DJ Hansford, "Multilayer micromolding of degradable polymer tissue engineering scaffolds," *Materials Science and Engineering C*, in press, available online April 14, 2007.

N Ferrell, J Woodard, and DJ Hansford, "Fabrication of polymer microstructures for MEMS: Sacrificial Layer Micromolding (SLaM) and Patterned Substrate Micromolding (PSM)," *Biomedical Microdevices*, **9**: 815-821, 2007.

N Higueta, D Gallego, F García, LE López, C Sarassa, P Agudelo, AS Litsky, DJ Hansford, "Development of polydimethylsiloxane-reinforced Portland cement porous scaffolds for load-bearing bone tissue engineering applications," *Int. Conf. Mech. of Biomaterials and Tissues*, Lihue, HI, Dec. 13, 2007.

J Guan, N Ferrell, B Yu, DJ Hansford, and LJ Lee, "Simultaneous fabrication of hybrid arrays of nanowires and micro/nanoparticles by dewetting on micropillars," *Soft Matter*, **3**(11): 1369-1371, 2007.

E Apaydin, DJ Hansford, S Koulouridis, J Volakis, "Integrated RF circuits design and packaging in high contrast ceramic-polymer composites," *IEEE International Symposium on Antennas and Propagation*, **201.9**, Honolulu, HI, June 10-15, 2007.

J Kitzmiller, DJ Hansford, L Fortin, K Obrietan, V Bergdall, and D Beversdorf, "Micro-field evoked potentials recorded from the porcine sub-dural cortical surface utilizing a micro-electrode array," *Jo Neuroscience Methods*, **162**: 155-161, 2007.

AJ Spiwak, S Warron, S Sullivan, C Sopkovich, DJ Hansford, "Effect of pump operation on temperature change and weight change of a new tubing product for peristaltic pump operation," *Amer Soc Extracorp Tech*, Atlanta, GA, Apr 25-28, 2007.

Fellowship Award for outstanding scientific presentation

M Palacio, B Bhushan, N Ferrell, and D Hansford, "Nanomechanical characterization of polymer beam structures for BioMEMS applications," *Sensors and Actuators A*, **135**: 637-650, 2007.

N Ferrell and DJ Hansford, "Micro and nanoscale fabrication of polymer structures by soft lithography spin dewetting," *Macromolecules Rapid Communications*, **28**: 966-971, 2007.

J Guan, LJ Lee, and DJ Hansford, "Fabrication of particulate-like polymer microstructures for drug delivery by soft lithography," *Small*, **3** (3): 412-418, 2007.

S Koulouridis, G Kiziltas, Y Zhou, D Hansford, and J Volakis, "Polymer-ceramic composites for microwave applications: Fabrication and performance assessment," *IEEE Trans. Microwave Theory and Techniques*, **54** (12): 4202-4208, 2007.

R Butler, N Ferrell, and DJ Hansford, "Spatial and geometrical control of silicification using a patterned poly-L-lysine template", *Applied Surface Science*, **252**: 7337-7342, 2006.

J Guan, N Ferrell, LJ Lee, and DJ Hansford, "Fabrication of polymeric microparticles for drug delivery by soft lithography," *Biomaterials*, **27**: 4034-4041, 2006.

J Kitzmiller, DQ Beversdorf, and DJ Hansford, "Microfabrication of microelectrode arrays for neural column potentiometry", *Biomedical Microdevices*, **8**, pp. 81-85, 2006.

H Borteh, N Ferrell, R Butler, SV Olesik, DJ Hansford, "Deposition of gold nanoparticles over silicon-based substrates patterned with peptides," *232nd ACS National Meeting*, September 10-14, 2006, San Francisco, CA.

B Bhushan, DJ Hansford, and KK Lee, "Surface modification of silicon and PDMS surfaces with vapor phase deposited ultrathin fluorosilane films for biomedical nanodevices," *Journal of Vacuum Science and Technology A*, **24**:4, pp. 1197-1202, July/Aug. 2006.

J Guan, H He, DJ Hansford, and LJ Lee, "Self-folding of three-dimensional hydrogel microstructures," *Journal of Physical Chemistry B: Condensed Matter, Materials Surfaces, Interfaces, and Biophysics*, **109**:49, pp. 23134-7, Dec. 15, 2005.

J Guan, A Chakrapani, and DJ Hansford, "Polymer microparticles fabricated by soft lithography," *Chemistry of Materials*, **17**:25, pp. 6627-6629, 2005.

Z Zheng, DJ Hansford, and AT Conlisk, "Effect of multivalent ions on electroosmotic flow in micro and nanochannels," *Electrophoresis*, Vol. 24, No. 17, pp. 3006-3017, 2003.

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