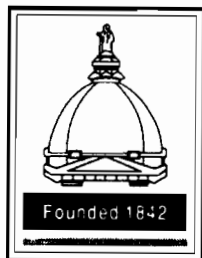


AEROSPACE & MECHANICAL ENGINEERING



2005 COLLOQUIUM 2006

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INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365, ENGR. BLDG.

UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

SPEAKER: **Dr. Jim E. Smay**
School of Chemical Engineering
Oklahoma State University
Stillwater, Oklahoma

TOPIC: **DIRECT WRITING OF FUNCTIONAL 3-D DEVICES
USING COLLOIDAL GEL INKS**

DATE: Tuesday, February 21, 2006

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

Abstract

Solid freeform fabrication (SFF) is a process enabling the layer-by-layer assembly of engineering prototypes for form and fit. Direct write approaches to SFF offer the additional advantage of being able to vary composition within a three-dimensional structure. This seminar will detail the development of ceramic, metal, and polymer colloidal gels that are used as ink in the direct write process and give application examples and characterization data for functional devices. Examples of functional ceramic/polymer piezoelectric composites, ceramic/ceramic structural composites, ceramic/metal composites and polymer/polymer composites will be highlighted. Recently, we have developed a method to explore mixed oxide ceramic systems using the direct write approach to print ternary arrays of barium titanate, barium zirconate and strontium titanate in a combinatorial fashion. The dielectric characterization of these compositions will be discussed. In addition, our work to engineer residual stresses in alumina-zirconia composites via thermal expansion mismatch will be discussed. X-Ray tomography and in-situ X-ray stress analysis were used to quantify residual stress and structural inhomogeneities in these structures. Finally, our preliminary work on printing of polymer scaffolds for tissue engineering and drug delivery will be discussed.

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NOTE: *If you are interested in meeting individually with
Dr. Smay, please contact Evelyn at 631-5431.*