2013 MRS FALL MEETING & EXHIBIT

December 1–6, 2013
Boston, Massachusetts

CALL FOR PAPERS
Abstract Deadline: June 19, 2013
www.mrs.org/fall2013

REMINDER: In fairness to all potential authors, late abstracts will not be accepted.

MRS Symposium VV: Designed Cellular Materials—Synthesis, Modeling, Analysis and Applications

Control and design of the mm-to-nm architecture of cellular materials has become possible through new parallel and serial material processing methods such as polymer-based templating (including stereolithography and photopolymer waveguide prototyping) and direct single- or multimaterial formation (including direct laser sintering, deformed metal lattices and 3D weaving and knitting). These methods dramatically transcend traditional techniques used to form stochastic cellular materials (e.g., foaming) and 2D-ordered cellular structures (e.g., expanded honeycomb). Precise control over the geometric arrangement of solid phases and voids is now possible at multiple length scales, enabling substantially improved control over material utilization. The result is efficient multiscale cellular materials with unprecedented ranges of density, stiffness, strength, energy absorption, porosity/permeability, chemical reactivity and other multifunctional properties. The ordered, topologically complex nature of these materials and the degree of precision with which their features can now be defined suggests the development of new multiphysics multiscale modeling tools that can enable optimal design. These new topologically optimized materials promise dramatic advances across important technology areas such as lightweight structures, functional coatings, bioscaffolds, catalyst supports and other applications. This symposium will cover new processing methods, modeling and analysis tools, and explore new automotive, aerospace, medical and energy applications.

Topics will include (but will not be limited to):

- Advances in manufacturing
  - Advances in solid free-form manufacturing (e.g., stereolithography, SLS, SLA, new direct-write techniques, etc.)
  - Novel parallel and batch-processing techniques for scalable manufacturing
  - 3D weaving, knitting and other fiber forms/preforms
- Modeling and analysis
  - Optimization of cellular topology (structure-to-property relations)
  - Inverse methods (function-to-structure)
  - Multiscale multiphysics modeling of multifunctional properties
  - Multiscale testing (e.g., linking constituent, topological and bulk properties)
  - 3D tomography and related techniques
- Applications of optimal cellular materials
  - Structural materials (e.g., microlattices and ordered foams)
  - Designed bioscaffolds (e.g., bone/tissue growth)
  - Multiscale multifunctional materials (e.g., mechanical support plus catalysis and structural thermal management)
  - Energy applications (e.g., current collectors, battery electrodes, heat exchange and filtration)
  - Impact, shock and blast absorption

Invited speakers include:

Katia Bertoldi (Harvard Univ.), **Dana Dattelbaum** (Los Alamos National Lab), **Eric Deck** (Boeing Research and Technology), **Eric Duoss** (Lawrence Livermore National Lab), **Arthur Fortini** (Ultramet), **Kevin Hemker (**Johns Hopkins Univ.), **Alan Jacobsen** (HRL Labs LLC), **Nilesh Makambe** (General Motors), **Chris Roper** (HRL Labs LLC), **Carl Simon** (National Inst. of Standards and Technology), **Haydn Wadley** (Univ. of Virginia), **Frank Zok** (Univ. of California, Santa Barbara).

Symposium Organizers

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