

MRS/Kavli Future of Materials Workshop: 3D Printing of Biomedical Materials and Devices

Presented by MRS Bulletin

December 2, 2017, 7:00 am-5:00 pm
Commonwealth Room, Boston Sheraton Hotel
Boston, Massachusetts

Chairs: Susmita Bose (Washington State University), Amit Bandyopadhyay (Washington State University), Michael J. Yaszemski (Mayo Clinic) and Roger Narayan (University of North Carolina)

PROGRAM

7:00 to 8:00 AM **Registration & Breakfast**

Session I – 8:00 AM to 10:00 AM

Moderator: Susmita Bose

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| 8:00 to 8:10 | Opening Remarks Todd Osman, Executive Director, Materials Research Society David Steuerman, Science Program Officer, The Kavli Foundation |
| 8:10 to 8:25 | Introductions: All invited members and attendees |
| 8:25 to 8:40 | 3D Printing of Bioceramics in Treatment of Bone Disorder: Opportunities and Challenges Susmita Bose, Washington State University |
| 8:40 to 9:00 | Integrating Digital and Biological Self-Assembly to Build Vascularized Organ-Specific Tissues Jennifer A. Lewis, Harvard University |
| 9:00 to 9:20 | 3D Printing for <i>In Vivo</i> Applications Jeremy Mao, Columbia University |
| 9:20 to 9:40 | In-Hospital Medical 3D Printing: An Enabling Technology Improving Care at The Mayo Clinic Jonathan Morris, Mayo Clinic |
| 9:40 to 10:00 | Panel Discussion |
| 10:00 to 10:15 | Coffee Break |

Session II – 10:15 AM to 11:50 AM

Moderator: Roger Narayan

- 10:15 to 10:35** Inkjet Bioprinting
Brian Derby, University of Manchester
- 10:35 to 10:55** Additive Manufacturing—Patient Specific Implants, Instruments
Mukesh Kumar, Zimmer Biomet
- 10:55 to 11:15** 3D Inkjet Powder Printing of Implantable Biomaterials and Biomedical Devices: Opportunities and Challenges
Bikramjit Basu, Indian Institute of Science
- 11:15 to 11:30** 3D Printing of Polymer Medical Devices
Roger Narayan, University of North Carolina
- 11:30 to 11:50** Panel discussion
- 11:50 to 12:00** MRS Bio-Related Publications Activities
Roger Narayan, University of North Carolina

12:00 to 12:50 PM Lunch

Session III – 12:50 to 1:50 PM

Moderator: Jennifer Lewis

10-minute presentations

- Speaker 1:** Bioprinting for Vascularized Composite Musculoskeletal Tissue Engineering
Yunzhi Peter Yang, Stanford University
- Speaker 2:** 3D-Printing of Custom Assistive Devices
Albert Shih, University of Michigan and NIST
- Speaker 3:** 3D Bioprinting of Living Tissues and Organs: Challenges and Future Perspectives
Ibrahim T. Ozbolat, The Penn State University
- Speaker 4:** 3D Printing in Hospitals
Frank J. Rybicki, University of Ottawa

Panel discussion: 20 minutes

Session IV – 1:50 PM to 3:25 PM

Moderator: Amit Bandyopadhyay

- 1:50 to 2:05** 3D Printing of Metallic Biomaterials
Amit Bandyopadhyay, Washington State University
- 2:05 to 2:25** Low-Temperature Deposition Manufacturing (3D Printing) of bBone and
Osteochondral Scaffolds with Gradient Structure for *In Vivo* Study
Wei Sun, Tsinghua University
- 2:25 to 2:45** Creating Medical Models in a Hospital-Based 3D Printing Lab: Our
Experience over 11 years
Jane S. Matsumoto, Mayo Clinic
- 2:45 to 3:05** 3D Printing: Revolutionizing the Healthcare Industry
Gautam Gupta, 3D Systems
- 3:05 to 3:25** Panel Discussion
- 3:25 to 3:45** **Coffee Break**

Session V – 3:45 PM to 4:30 PM

Moderator: Jonathan Morris

10-minute presentations

- Speaker 5:** From Flatland to Spaceland: Higher Dimensional Printing and Patterning with 2D
Nanomaterials
Ian Y. Wong, Brown University
- Speaker 6:** The Art of 3D-Printing Biocompatible Microfluidics
Albert Folch, University of Washington
- Speaker 7:** 3D Printing Plant Cells
Paul Calvert, New Mexico Tech

Panel discussion: 15 minutes

Concluding Session – 4:30 PM to 5:00 PM

Moderators: Susmita Bose, Amit Bandyopadhyay, and Roger Narayan

**Open forum discussion and closing remarks: Future of 3D printing in Biomaterials and
Biomedical Devices**