# Measuring, Modeling, and Reproducing Material Appearance 2016

## Introduction

The rapid and continuous development of rendering devices such as displays and printers offers interesting challenges related to how materials are understood. Over the years, researchers from different disciplines have studied the interaction of incident light with the texture and surface geometry of a given object, as well as the optical properties of distinct materials. Thanks to those efforts, we have been able to render with high accuracy 2.5D and 3D objects and scenes. But given the day-to-day technological improvements of materials and devices along with the advances in the areas of visual and tactile perception, modeling how light interacts with materials, and techniques for measuring material properties, the field of material appearance is in constant evolution. This conference offers the possibility to share research results and establish new collaborations among academic and industrial researchers from these related fields. Papers are solicited in, but not limited to, the following categories:

• Methods for measuring material properties: measurement of Bidirectional Reflectance Distribution Functions (BRDF), Bidirectional Texture Functions (BTF) and Bidirectional Surface Scattering Reflectance Distribution Function (BSSRDF); estimation of material difference perception; evaluation of metallic coatings/inks; measurement of glossiness; estimation of texture perception; data acquisition methods for different types of materials.

• Models for distinct characteristics of materials: modeling of Bidirectional Reflectance Distribution Functions (BRDF), Bidirectional Texture Functions (BTF) and Bidirectional Surface Scattering Reflectance Distribution Function (BSSRDF); modeling material difference perception; appearance modeling of glossiness and texture; modeling of varnish and special effects inks; softproofing methods for 2.5D and 3D printing.

• Material reproduction aspects: quality evaluation of 2.5D and 3D soft- and hard-copy reproductions (display and printing); estimation of effects of environmental aspects in material perception (lighting, observers' position, printing media); estimation of sensory input (visual, touch, audio) effect in material perception; evaluation of aesthetic aspects of 2.5D and 3D soft- and hardcopy reproductions (display and printing); saliency of 2.5D and 3D soft- and hard-copy reproductions (display and printing); imaging and perception of metallic and effect coatings/inks; saliency, quality, and aesthetics in appearance reproduction; spectral reproduction.


Photo: Dietmar Wueller.

**Symposium Chairs:** **Choon-Woo Kim,** Inha University (Korea, the Republic of), **Nitin Sampat,** Rochester Institute of Technology (United States)

**Symposium Short Course Chairs:** **Majid Rabbani,** Eastman Kodak Co. (United States), **Mohamed-Chaker Larabi,** University of Poitiers (France)

**At-large Conference Chair Representative:** **Adnan Alattar,** Digimarc (United States)

**Local Liaison Chair:** **Joyce Farrell,** Stanford University (United States)

**Exhibit and Sponsorship Chair:** **Kevin Matherson,** Microsoft Corp. (United States)

**Past Symposium Chair:** **Sheila Hemami,** Northeastern University (United States)

**Conference Chairs:** **Francisco Imai,** Canon U.S.A., Inc. (United States), **Maria Ortiz Segovia,** Océ Print Logic Technologies (France), **Philipp Urban,** Fraunhofer Institute for Computer Graphics Research IGD (Germany)

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## Monday, February 15, 2016

**Keynote: Computational Imaging for Inverse Scattering**
Session Chair: Philipp Urban, Fraunhofer IGD (Germany)
**8:50 – 9:50 am**
Continental Ballroom 2

MMRMA-354

**Computational imaging for inverse scattering,** *Ioannis Gkioulekas[1], Kavita Bala[2], Frédo Durand[3], Anat Levin[4], Shuang Zhao[5], and Todd Zickler[1]; [1]Harvard University (USA), [2]Cornell University (USA), [3]Massachusetts Institute of Technology (USA), [4]The Weizmann Institute of Science (Israel), and [5]University of California, Irvine (USA)*

### Measuring

Session Chair: Maria Ortiz Segovia, Océ - Canon Group (France)

**9:50 – 10:10 am**
Continental Ballroom 2

MMRMA-355

**Trichromatic reflectance capture using a tunable light source: Setup, characterization and reflectance estimation,** *Tejas Tanksale and Philipp Urban, Fraunhofer IGD (Germany)*

10:10 – 10:50 am        Coffee Break

### Measuring (continued)

Session Chair: Greg Ward, Dolby Laboratories (USA)

**10:50 am – 12:30 pm**
Continental Ballroom 2

10:50                                             MMRMA-356
**BRDF interpolation using anisotropic stencils,** *Radomir Vavra and Jiri Filip, Inst. of Information Theory and Automation of the CAS (Czech Republic)*

11:10                                             MMRMA-357
**3D scanner characterisation for open design,** *Fabrizio Valpreda[1] and Paola Iacomussi[2]; [1]Politecnico di Torino and [2]INRIM (Italy)*

11:30                                             MMRMA-358
**Learning optimal incident illumination using spectral BRDF images for material classification (JIST-first),** *Sandra Skaff, Siu-Kei Tin, and Manuel Martinello, Canon USA (USA)*

11:50                                             MMRMA-359
**Multispectral BRDF measurements on anisotropic surfaces: Application to structured metallic surfaces and the aspect simulation of OLED displays,** *Pierre Boher, Thierry Leroux, Thibault Bignon, and Véronique Collomb-Patton, ELDIM (France)*

12:10                                             MMRMA-360
**Image based reflectance measurement based on camera spectral sensitivities,** *Aditya Sole[1], Ivar Farup[1], and Shoji Tominaga[2]; [1]Gjøvik University College (Norway) and [2]Graduate School of Advanced Integration Science, Chiba University (Japan)*

12:30 – 2:00 pm        Lunch Break

**EI 2016 Opening Plenary and Symposium Awards**
Session Chair: Choon-Woo Kim (Inha University)
**2:00 – 3:00 PM**
Continental Ballroom 5

**Illuminating a bright future for medicine,** *Audrey K. Bowden, Stanford University (USA)*

3:00 – 3:30 pm        Coffee Break

### Reproducing

Session Chair: Ingeborg Tastl, Hewlett-Packard Laboratories (USA)

**3:30 – 4:30 pm**
Continental Ballroom 2

3:30                                             MMRMA-361
**Relating optical and geometric surface characteristics for gloss management in printing applications (JIST-first),** *Teun Baar[1,2], Hans Brettel[1], and Maria Ortiz Segovia[2]; [1]Institut Mines - Télécom and [2]OCE Print Logic Technologies (France)*

3:50                                             MMRMA-362
**An exploration of 2.5D printing as tactile pictures,** *Carinna Parraman[1] and Maria Ortiz Segovia[2]; [1]University of the West of England (United Kingdom) and [2]Océ Print Logic Technologies SA (France)*

4:10                                             MMRMA-363
**Interrelation between gloss and texture perception of 2.5D-printed surfaces,** *Teun Baar[1,2], Sepideh Samadzadegan[3], Philipp Urban[4], and Maria Ortiz Segovia[2]; [1]Institut Mines-Télécom; Télécom ParisTech (France), [2]Océ Print Logic Technologies (France), [3]Technische Universität Darmstadt (Germany), and [4]Fraunhofer IGD (Germany)*

5:00 – 6:00 pm        EI 2016 Symposium Reception

## Tuesday, February 16, 2016

### Perception in MMRMA

Session Chairs: Mathieu Hebert, Université Jean Monnet de Saint Etienne (France) and Sabine Süsstrunk, EPFL-IC-IVRL (Switzerland)

**8:50 – 10:20 am**
Continental Ballroom 2

8:50                                             MMRMA-364
**Modeling and estimation for surface-spectral reflectance of watercolor paintings,** *Shoji Tominaga and Takahiko Horiuchi, Chiba University (Japan)*

9:10                                             MMRMA-365
**Brightness and sparkle appearance of goniochromatic samples,** *Paola Iacomussi, Michela Radis, and Giuseppe Rossi, INRIM (Italy)*

9:30                                             MMRMA-366
**Perceptual dependencies between texture and color in fabric appearance,** *Takafumi Katsunuma, Keita Hirai, and Takahiko Horiuchi, Chiba University (Japan)*

9:50 MMRMA-367

**Effects of mesoscale surface structure on perceived brightness,** *Michael Ludwig and Gary Meyer, University of Minnesota (USA)*

10:20 – 10:40 am Coffee Break

**Invited Speaker: Refractive Object Reconstruction using Computational Imaging**
Session Chair: Francisco Imai, Canon U.S.A. Inc. (USA)
**10:40 – 11:20 am**
Continental Ballroom 2

MMRMA-368

**Refractive object reconstruction using computational imaging,**
*Gordon Wetzstein, Stanford University (USA)*

## Modeling

Session Chair: Susan Farnand, Rochester Institute of Technology (USA)

**11:20 am – 12:30 pm**
Continental Ballroom 2

11:20 MMRMA-369

**Assessing the capacity of a two-flux model to predict the spectral reflectance of stratified coloring coatings,** *Mathieu Hebert[1,2], Serge Mazauric[1], and Lionel Simonot[3]; [1]Université Jean Monnet, [2]Institut d'Optique Graduate School, and [3]Université de Poitiers (France)*

11:40 MMRMA-370

**Fitting analytical BRDF models to low-resolution measurements of light scattered from relief printing samples,** *Ni Yan[1], Teun Baar[2], Maria Ortiz Segovia[2], and Jan Allebach[1]; [1]Purdue University (USA) and [2]Océ Print Logic Technologies (France)*

12:00 MMRMA-371

**Testing spatial patterns for acquiring shape and subsurface scattering properties,** *Yitzchak Lockerman, Samuel Brenner, Joseph Lanzone, Alexander Doronin, and Holly Rushmeier, Yale Univ (USA)*

12:30 – 2:00 pm Lunch Break

**EI 2016 Tuesday Plenary and Symposium Awards**
Session Chair: Nitin Sampat (Rochester Institute of Technology)
**2:00 – 3:00 PM**
Continental Ballroom 5

**Pushing computational photography deeper into imaging system design,** *Ren Ng, University of California, Berkeley (USA)*

3:00 – 3:30 pm Coffee Break

**EI 2016 Symposium Demonstration Session and Exhibit Hall Happy Hour**
**5:30 – 7:00 PM**
Continental Ballroom Foyer