



Inter-Society Color Council News

Issue 442

November-December 2009

ISCC/CORM Meeting Postponed Until March 2-3, 2010

The joint meeting of the Inter-Society Color Council and The Council for Optical Radiation Measurements scheduled for October 13-14, 2009 was postponed. The meeting entitled Lighting in Artistic, Commercial, and Retail Spaces has been rescheduled for March 2-3, 2010 and will be held at the National Institute of Standards and Technology in Gaithersburg, MD. The conference will be applications-based and looks to draw a field of experts from the fashion, commercial, and conservation (museum lighting) fields as well as general experts in the field of lighting.

Additional information will be published on the ISCC web site (www.iscc.org) and in future issues of the newsletter as it becomes available.

Planning Initiated for October 2010 Conference

A joint meeting of ISCC and AATCC will be held Oct 5-7, 2010 at the College of Textiles, North Carolina State University, Raleigh, NC. The meeting is titled, 4M: Multi Media – Multi Material: Color Control. The chairs of the meeting are Dr. Michael Brill and Dr. David Hinks. Additional information is included on page 9 of this newsletter and details will be published in upcoming issues of the newsletter and on the ISCC web site, www.iscc.org.

Joint Meeting of CIE/Canada and CIE/USA

October 15 and 16, 2009, the National Institute of Standards and Technology (NIST) hosted the joint Annual Meetings of the CIE/Canada and CIE/USA in Gaithersburg, Maryland. The format set the first day as a Symposium and the second day for individual and then joint meetings of the two country's groups followed by a tour of new facilities at NIST.

The Symposium included six presentations:

1) "Using Core Sunlight to Improve Office Illumination by Lorne Whitehead" from the University of British Columbia. Dr. Whitehead pointed out that breakthroughs occur when, at the same time, there are increases in quality and decreases in cost. LEDs have promise, electrodeless discharge lamps are coming, and core sunlighting is something worth paying more for. Following the principle that using sunlight is the same as generating electricity (i.e., electricity is not being used), he described projects that have sunlight panels that let light into a building, thus freeing the electricity that would have been used for lighting to be used elsewhere. The advantages are: reducing conversion losses, eliminating the middle-man (electricity), liberating more power per

Continued on page 2

Contents

ISCC/CORM Meeting Postponed	1
Planning Initiated for October 2010	
Conference	1
Joint Meeting of CIE/Canada and CIE/USA ..	1
HUE ANGLES: Color Creeks Ray Winey	
Has Found People Up	3
Member News: Mike Brill Enjoys "English	
Teaching Vacation" in Russia, Redux	4
The History of a Color Collection	5
Joint Meeting of ISCC/ASTM E12/CIE	
Div. 1 Standards:	7
Initial Announcement: Joint Meeting of	
AATCC and ISCC	9
Puzzle Feature	9
CALENDAR	10
COLORCUBES FOR SALE:	11
Publications Available from	
ISCC Office	11
ISCC Sustaining Members	12
ISCC Member Bodies	12

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dollar of panel, and providing natural lighting. How concentrated does the light have to be? The concentration ratio is around 10:1. This means that there's enough light falling on the side of a building to collect more than enough through the windows. As the sun dims, the use of electrically produced lighting may increase or not be needed. Even on cloudy day the sunlight is 30 lux, which is low, but may make it possible to see.

2) Jim Love, from the University of Calgary, titled his talk "From Research to Hypotheses: Day-light in Classrooms." He is the chair in a sustainable building technologies group and described many architectural projects in Canadian schools comparing windowless and windowed environments.

3) Wendy Davis from NIST reported on the new Spectrally-tunable Lighting Facility. It is now up and running, and they are conducting research.

4) Yoshi Ohno from NIST reported on a Visual Evaluation Experiment on Chroma Enhancement Effects in Color Rendering of Light. This project is in conjunction with the work of CIE TC 1.69.

5) The National Voluntary Laboratory Accreditation Program (NVLAP) for solid-state lighting products testing was described by Cameron Miller from NIST. There is a second handbook for testing LED/SSL products.

6) "Functional and Decorative Luminaires: What's the Difference and Why is it important?" was presented by Terry McGowan, Director of Engineering American Lighting Association.

During the second day, the CIE/USA and CIE/Canada had their individual business meetings followed by a joint session to review news and new projects from the CIE. There was also a meeting of the Technical Advisory Group (TAG) to ISO. The most recent ISO ballot action was on the joint ISO FDIS 11664-5 E Colorimetry Part 5: CIE 1976 L*u*v* Colour Space and u',v' uniform chromaticity scale diagram. This will probably become a joint ISO/CIE standard soon.

The rest of the second day was devoted to tours at NIST. Wendy Davis led a tour of the new Spectrally Tunable Lighting Facility and other areas as requested by the visitors.

Ellen Carter

HUE ANGLES

(send contributions to mbrill@datacolor.com)

Who was the first to perform colorant formulation on a digital computer? Bill Longley here makes the case that—at least in the U.S.—it was his mentor, Ray K. Winey. Winey is also known for the metameric specimens he made, which screamed, “Matching under two lights is not enough!” It is hard to make metamers, and also to convince people to avoid mistakes in color science, yet Winey did both. Longley talks about it in...

Color Creeks Ray Winey Has Found People Up

I had the rare good luck after graduating from college in 1958 to work under direction of Ray K. Winey at US Rubber Co (later Uniroyal) in coloring of Naugahyde upholstery material. Ray had majored in chemistry at Notre Dame and spent his career in Mishawaka, Indiana, never wanting to wander very far. When he spotted an interesting conference he would send one of us and then eagerly debrief us upon our return. Ray, now deceased, was a genius with an intriguing grasp of poetry as well as battlefield war strategy. His recall and passion for all aspects of color science was overwhelming to color chemists who came under his direction.

Davidson & Hemmendinger had introduced the COMIC, an analog computer with wavelength/reflectance scope which aided the colorist in developing initial colorant formulations. I persuaded Ray to make the short drive to Chicago to see COMIC at an equipment show. Here we met Henry Hemmendinger, who patiently demonstrated COMIC for the umpteenth time that day. Ray folded his arms and commented, “Very interesting, but I prefer the digital approach.” Henry wanted more discussion, so he called for assistance with the exhibit and then he and Ray moved to a nearby table and launched into an unforgettable session.

Ray summarized his work on digital computer matching in a company report [1] dated 15 August 1962, complete with color standards and resulting swatch matches. The report discusses limitations of analog computing, especially assumption of zero scattering. Rather than requiring the colorist to select pigments for the match, Ray directed the program to consider all possibilities of 3 pigments plus white, and then report the matches with least spectral differences. If dissatisfied with results, he could direct the program to add a fourth pigment. Ray’s report cites Kubelka-Munk and computes relative K and S coefficients, 10 parts TiO₂ to one part color

pigment. He relates reflection to K/S ratio using the Saunderson surface correction. Computing was slow so he loaded data into the Bendix G20 at close of office hours and collected results the next morning. Contemporaries in the field who have seen a copy of the report have marveled at digitally calculated two-constant theory at that early date. It wasn’t until five years later that D&H offered the COMIC II digital computation unit.

Details and comments on the report are offered by another Winey protégé, Ron Penrod, at www.rpdms.com. Site viewers will also find there an excellent color matching program, workable in four modes with conversions. [Editor’s note: Do any readers know if E. Atherton’s program from the UK (reported in 1961 *J. Soc. Dyers Col.*, and reputed to have run since 1956) had the capabilities described here?]

Ralph Stanziola and Max Saltzman were among many who visited Ray in Mishawaka. He enjoyed showing visitors his “dilemma” samples (two metameric swatches), asking how the visitor would add a correction to the metameric mismatch that was redder than the standard in daylight and greener in tungsten. Told this was impossible, he then presented another swatch containing pigments that flared green to the standard in daylight and red in tungsten. In fact this is how the standard had been made.

Ray had some classic correspondence with Norman Macbeth and Warren Reese concerning Macbeth claims for their industrial light-source unit, that samples matching in D7500 daylight (blue end) and D2300 tungsten (yellow end) would match anywhere. Ray produced numerous samples to disprove the claim. Eventually Macbeth added cool white fluorescent as a third source for matching, also standardizing on D6500 daylight. I like to think that Ray provided the impetus.

Continued on page 4

Continued from page 3

I offer these notes here to credit Ray for his pioneering work in color science. I inherited Ray's "golden" files and sometimes wonder what to do with the intriguing letters and metameric specimens. I have his hand-written note saying he wanted to write a book *Color Creeks I Have Found People Up*. He never wrote the book, but certainly had enough material for it.

1. D. F. Larimore and R. K. Winey, "Color Matching with the Aid of a Digital Computer," Report No. 62-L3-35, US Rubber Co., Divisional Laboratories, Consumer and Industrial Products Division, Mishawaka, Indiana, 15 August 1962.

*Bill Longley, Adjunct Professor, Eastern Michigan University
Retired, Ford Motor Co.*

Member News

Mike Brill Enjoys "English Teaching Vacation" in Russia, Redux

For three weeks (June 28-July 18), Mike Brill was in Yaroslavl, Russia (200 miles northeast of Moscow) teaching English to 64 Russian undergraduate and graduate science students. As last year in Tambov [see ISCC News # 435], Mike was one of eight teachers in a program sponsored by the U.S. Civilian Research and Development Foundation (CRDF). Another teacher, Dr. Stephen V. Hoyt (shown in photo) is a founder of the CRDF program and a former high-school classmate of Mike's. Steve teaches English at Eastern Washington University and wrote the article "False Hope" (www.cynicmag.com/feature.aspx?articleid=1202) that persuaded Mike to join in.

Again Mike's course, called "Color, Vision, and Invention," also ventured into areas such as heroism in science, and featured a math problem at the beginning of each class. A new exercise was to translate and analyze a Russian poem by Velimir Khlebnikov that ends, "I want to take out of brackets the common factor that connects me, the Sun, pearl dust, and the sky."

Compared to last year, the nights were whiter, the 17th Century churches were more numerous, and the number of moose observed crossing the road increased infinite-fold.

This year's students seemed smarter: They were able to solve and to find loopholes in the math problems. Mysteriously, they seemed to know last year's problems, so Mike had to work hard to challenge



Mike Brill and Stephen Hoyt watch student talks

them. A budding color scientist, Sergey Bibikov, will soon become familiar to the ISCC—or so Mike hopes.

Mike Brill, Datacolor

The ISCC
Newsletter
editors wish
you a very
happy holiday
season!

The History of a Color Collection

In 1997, during the time that Harry Hammond III and I co-chaired the ISCC History Committee, I investigated the status of historic color material that had been donated to the Cooper-Hewitt Museum in New York City. Dorothy Nickerson, who made the donation, began working for the Munsell Color Company in 1921 and in 1927 became Color Technologist at the Department of Agriculture. In both jobs she worked cooperatively with the National Bureau of Standards (now the National Institute for Standards and Technology) and served as a Trustee of the Munsell Foundation throughout its existence. She also maintained a correspondence with color experts throughout the world. During all these years she collected material which recorded the development of color science.

In 1973, when she retired and moved into an efficiency apartment, Dorothy packed and shipped 20 boxes of documents and objects to the Cooper-Hewitt Museum, whose Director at that time was interested in color and assured her that the material would be available for study. Dorothy also persuaded Albert H. Munsell's son, Alexander Munsell, and Walter Granville, another early figure in color science, to send their important material to the Cooper-Hewitt. ISCC members reported that these materials could not be seen. It was found that the Cooper-Hewitt had kept the collection for years in storage that was unheated and non air-conditioned, and at the time they were actively trying to get rid of it. The Hagley Museum and Library located near Wilmington, Delaware, was interested in becoming a center for the study of color and they accepted the collection.

The Cooper-Hewitt included color material donated by the Color Association of the United States and the Textile Color Card Association in the shipment to the Hagley, and nothing was properly labeled. The collections almost filled a huge storage room. Cataloguing would be slow because funds were scarce. ISCC members Paul Tannenbaum and Dave Spooner made trips to the Hagley to try to assist with identification and to photograph some items, and the ISCC Board of Directors established a special fund to accept donations to be used in making the collection available for research. There are two major reasons why this effort is important to ISCC members, one is making the color material

available for research and the other is to create a place where unique materials that are still in private hands will be accepted. Henry Hemmendinger's papers were recently given to the Hagley.

For a couple years the ISCC was able to send small sums to the Hagley to help pay for a graduate student to assist with work on the collection, then the ISCC effort ceased. In June Dave Wyble and I paid a visit to the Hagley Library and I believe we were both impressed with what has been accomplished and the value of the materials there. The color materials are kept in two buildings. Books and photographs are housed in the Library building itself, while documents and some three-dimensional artifacts are kept in the Soda House where the Manuscripts and Archives Department is located. In both buildings items can be requested and will be brought to a reading room where they may be examined and photographed.

Dave and I had limited time so we could only get a general idea of the scope of the collection. We met Lynn Catanese, Manuscripts and Archives Curator, at the Soda House, and after a discussion of the Hagley facilities and its policies, we requested a few items, which were brought to the reading room. One was a strange wooden color tree obviously made for teaching color but including some features that we could not interpret. We saw the first edition (1940) of the Plochere Color system and also complete sets from 1948 and 1965. This is a color system developed by a husband and wife team and is still being sold in California by their son. One of its virtues is that the pigments used in formulating the color samples are listed.



Joy Turner Luke examines documents at the Hagley

Continued on page 6

Continued from page 5

The next morning was spent in the Library building. Items are brought for inspection and you can request, at a nominal fee, that copies to be sent to you later. I asked to see items from Dorothy Nickerson's collection. I also examined Christine Ladd-Franklin's book *Color and Color Theories* and Maerz and Pauls's *Dictionary of Color*. On the list was an English translation of the preface to the first volume of *Mathetische Farbenlehre* by Von Wilhelm Ostwald, which is in five volumes and covers the whole field of chromatics. A note in Dorothy's hand says it is from the first edition in 1917 and was a gift from Walter Granville.

I noticed a film from the American Documentation Institute, which may be a record of Albert Munsell's original diaries, but there was not time to look at a film. A later typewritten copy of his diaries is available on the Munsell Color Science Laboratory's web site, but no one seems to know where his original tablets are. A film of the original diaries would show Munsell's own drawings and diagrams, instead of tracings made from them.

Since I am writing a history of the Munsell color system and Munsell Company, I ordered copies of a few items connected with the system's founder, Albert H. Munsell. These included a photo of the original diary covers, two photographs of Munsell with his children and of two of his paintings. They arrived later as tif files on a CD.

By far the best way to make use of the collection is to visit the Hagley Library. It is located in an attractive park setting on the old DuPont estate near Wilmington, Delaware, and there is a good motel nearby. However, the materials can be accessed and copies ordered through the Internet. Unfortunately, since the funds necessary to digitize the collection have not been available, the items in the collections are only listed.

A quick way to see the list should be to enter www.hagley.org/library/collections/manuscripts/findingaids/ISCC_acc2188_2189.pdf in your browser; however, if this does not work, go to the Hagley home page www.hagley.lib.de.us and choose 'Research' on the top menu, then 'Collection Guides and Finding Aids' on the left side of the next window, then under Browse chose 'Professional Organizations' and in the list 'Inter-Society Color Council,' and finally under 'Access' click on 'finding aid

(PDF)' which appears in blue type. This opens files 2188 and 2189. There is a telephone number for further information in this window.

The first few pages are a history of the ISCC, followed by an index covering the rest of 2188 and 2189. These files are divided into separate series and there are two appendices.

Series I contains the records and publications of the ISCC,

Series III contains records and publications of ISCC member-bodies,

Series IV contains material from the Munsell Color Company;

Series V contains the Dorothy Nickerson papers,

Series IX contains journals, periodicals, and manufacturers' catalogs,

Series X contains the artifacts, which include Munsell color sphere, disc spinning motor and Maxwell discs, various art materials, the Nickerson Color Fan, a Color Blindness Test, and the color model Dave and I saw [See the puzzle in this issue for a picture and challenge to identify and explain it.]

Donations from the Textile Color Card Association and the Color Association of the United States are in Series II.

Appendix A is a list of thirty-five books on color and twelve periodicals,

Appendix B contains House & Garden and Cooper-Hewitt material.

There is a brief description of the individual items in each Series, but no way to see, or select one; however, the items are numbered so it is possible to contact the Hagley to order a copy of appropriate materials.

I suggest that the ISCC again solicit donations from its members and member-bodies to assist in digitizing portions of the collection, making it possible to tell more about each item. Publicity about the collection is needed so people working in the color field, and also their families, know that a repository for historic color material exists. The papers of several pioneers in color science have already been lost.

Joy Turner Luke

Joint Meeting of ISCC/ASTM E12/CIE Div. 1

Standards:

What they are?

What should they be?

What will they be?

Princeton University, Princeton, NJ
June 14 – 18, 2010

June 14-18 will be a full week of interesting meetings with three organizations. ASTM Committee E12 on Color and Appearance will meet on June 14-15 for their bi-annual committee meetings. The ISCC Special Topical Meeting will be on June 16. Finally, CIE Division 1 will hold their technical sessions and committee meetings on June 17-18.

For the ISCC Meeting, the following authors and titles are now confirmed:

- **Wendy Davis**, NIST, “Color quality: Where we are; what’s next?”
- **Hugh Fairman**, Resource III, “Reflectance bandpass correction for the ASTM”
- **Changjun Li**, Univ. Leeds, “Tristimulus Integration”
- **Rolf Kuehni**, Color Consultant, “Mensurating a perceptual object color solid.”
- **Danny Rich**, Sun Chemical, “Documentary standards in graphic reproduction: Pathway to quality or highway to mediocrity? “
- **Ann L McCarthy**, Lexmark International Inc, “Balancing ‘Automatic Color’ and Artistic Intent: The Role of Color Standards”
- **Jan Henrik Wold**, Univ. Of Oslo, “XYZ colorimetry — still a relevant concept for a colorimetric standard?”

. There are still a few opportunities available to present a paper. Experts interested in contributing a paper on color standards, please send a title and a one-page abstract to either Michael Brill or Jack Ladson at the email addresses below, and contact Hugh Fairman for arrangement details. Updates will be printed in the newsletter and appear at www.iscc.org .

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Color Research and Application IN THIS ISSUE, December 2009

We open this issue with two very different applications of color science in the coatings industry. Both involve predicting the reflectance factor of the coatings. First, the Army was seeking a low-cost paint scheme for the CH-47F Chinook helicopter that had minimum-conspicuity when viewed in natural light against forest, desert, and sky backgrounds. In “Quantitative Camouflage Paint Selection for the CH-47F Helicopter,” Fred W. Bacon, Frank J. Iannarilli, Jr., John A. Conant, Torrey Deas and Malcolm Dinning discuss both the issues that needed to be considered and the path to the solution that they developed and tested.

The next article discusses a very different challenge – the applications of color science to art conservation science and spectral-based imaging, archiving, and reproduction of artwork. Work in these areas in the Munsell Color Science Laboratory at Rochester Institute of Technology has included pigment selection for developing a prototype calibration target for spectral imaging, pigment identification based upon spectral estimation, image segmentation and pigment mapping of paintings, improving spectral imaging by incorporating pigment mapping, digitally rejuvenating the appearance of paintings having temporal color changes, and pigment selection for restorative inpainting. Most of this work has focused on opaque coatings. However, in this issue Yonghui Zhao and Roy S. Berns discuss the special challenges of “Predicting the Spectral Reflectance Factor of Translucent Artist Paints.”

While we are in the mind set of translucent coloring materials, it would be a good time to move to the printing industry for our next article. When using translucent materials, the thickness of the layer is of particular importance and that is the topic of the next article, “Deducing Ink Thickness Variations by A Spectral Prediction Model.” For this project a large group of researchers from Ecole Polytechnique Fédérale de Lausanne in Switzerland combined their expertise with others from Maschinenfabrik Wifag to develop a methodology to deduce ink thickness variations from spectral measurements of multi-chromatic halftone patches located within the print page. They extend the Clapper – Yule spectral reflectance prediction model by expressing the transmittance of the colorants composed of superposed inks as a function of the ink transmittances and of fitted ink layer

thicknesses. Roger D. Hersch, Mathieu Brichon, Peter Bugnon, Frederique Amrhy, Thomas Crete, and Safer Mourad are all from Ecole Polytechnique Fédérale de Lausanne; Hebert Janser, Yufan Jiang, and Matthias Riepenhoff are from Maschinenfabrik Wifag.

It seems that our world is getting brighter and more colorful everyday. We can produce and reproduce a wider and wider gamut of colors. However, every system has its own limits on what colors can be produced or reproduced. In addition, the transmission standards for color data, such as those for television, also have gamut limitations. All this makes it even more important that we know how to map out-of-gamut colors into the system gamut in the most pleasing way. Our next article tackles these issues. In “Development and Evaluation of Gamut Extension Algorithms,” Justin Laird, Remco Muijs, and Jiangtao Kuang discuss color mapping strategies, examine algorithms, and propose an extension to the true color mapping algorithm. The color rendering performance and robustness to different image content of these algorithms are evaluated against a reference (true-color) mapping.

As Kobayashi’s seminal work reported in this journal in 1981, researchers have been investigating the common meaning between a specific color perceived and the color sense expressed in words. Through the last 20 years the work has evolved into a discussion of emotional response to color, often quantified in color emotion scales. However, there is discussion as to whether emotion or image scales bear clearer relationship to the color parameters that an observer understands. Therefore, Wen-Guey Kuo developed “A New Colour Image Space HRU Related to the CIEL*a*b* Colour Space.” In the article presented in this issue, Dr. Kuo discusses how the psychophysical experiments of visual assessment using the magnitude estimation method were conducted to quantify the color image and the derivation of new color image scales and a new color image space. Finally, the relationship between the color attribute scales of CIE $L^*a^*b^*$ color space and the new color image space are also discussed.

We choose safety clothing, such as orange hunting jackets, for their conspicuity. But how will the color hold up over time and outdoor exposure? For our final article is this issue, Rosario Gonzalez-Mota, Juan J. Soto-Bernal, Iliana Rosales-Candelas, Claudio Frausto-Reyes, and Jose T. Vega-Duran

report on the “Superficial Degradation Evaluated through Color Change in Weathered Orange LLDPE.” By studying both orange and clear linear low density polyethylene, they found that the degradation, yes there was degradation, was due entirely to the pigment.

We close this year and this issue with two book reviews, an announcement about a new CIE Publication, and the annual index. Leslie Harrington reviews *Colour Forecasting* by Tracy and Tom Cassidy. Louis Silverstein talks about the new (2nd) edition of *Projection Displays* by Brennesholtz and Stupp. The International Commission on Illumination (CIE) has published a supplement to Publication 121 on the Photometry and Goniophotometry of Luminaires. *Supplement 1: Luminaires For Emergency Lighting* (Publ 121-SP1:2009) provides measurement methods for testing the compliance of emergency luminaires with the photometric requirements of IEC safety standards.

Ellen Carter
Editor, *Color Research and Application*

Puzzle Feature



To the left is an image of the “wooden tree” that Joy Turner Luke and Dave Wyble saw at the Hagley Museum and Library. The challenge this month is to identify it, contribute to our understanding of it or describe its use in teaching or other ac-

tivities in which it was used. Responses are requested and may be included in the next newsletter. Please send responses to mary.mcknight@starpower.net.

Initial Announcement: Joint Meeting of AATCC and ISCC

4M:

Multi Media – Multi Material: Color Control

Dates: October 5 – 7, 2010

Location: College of Textiles, North Carolina State University

Raleigh, North Carolina

Please contact either of the CoChairs for additional information.

CoChairs:

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Further details and Call for Papers to appear in the following issues of ISCC Newsletter.

CALENDAR

Please send any information on Member-Body and other organization meetings involving color and appearance functions to:

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2009

- Nov 9-11** **Seventeenth Color Imaging Conference**, The Society for Imaging Science and Technology cosponsored by the Society for Information Display (SID), Albuquerque, New Mexico, 703-642-9090, www.imaging.org
- Nov 13-17** **CMG 2009 Fall International Conference**, New Orleans, Louisiana, www.colormarketing.org/Visitors.aspx?id=1232&
- Nov 15-17** **IES Annual Conference**, Illuminating Engineering Society, Seattle, Washington, www.ies.org
- Dec 15** **Colorimetry Workshop**, Berlin University of Technology, "Veranstaltungen (meetings)" at www.li.tu-berlin.de

2010

- Jan 20-22** **ASTM E12, Color and Appearance**, Embassy Suites Hotel; Ft. Lauderdale, FL, www.astm.org.
- Mar 2-3** **ISCC/CORM Special Topics Conference on Lighting in Art, Commercial and Retail Spaces**, National Institute of Standards and Technology, Gaithersburg, MD, ISCC - 703-318-0263, www.iscc.org; CORM - www.cormusa.org
- Mar 14-17** **TAGA 62nd Annual Technical Conference**, The Horton Grand Hotel, San Diego, California, www.printing.org/taga
- Apr 18-21** **2010 Annual Conference, Association of Printing Ink Manufacturing**, Arizona Biltmore Hotel, Phoenix, Arizona, www.napim.org/publicarea/Conv2010/Place.aspx
- May 16-20** **ANTEC 2010**, Society of Plastic Engineers, Marriot World Center, Orlando, Florida, specad.e-xyn.com/index.php?navid=124
- May 18-20** **AATCC's International Conference (IC)**, Georgia World Conference Center, Atlanta, Ga., USA, www.aatcc.org/ic/index.cfm
- May 23-28** **SID 2010 International Symposium, Seminar, and Exhibition**, Washington State Convention and Trade Center, Seattle, WA, www.sid.org/conf/sid2010/sid2010.html
- Jun 1-4** **Archiving 2010**, Society for Imaging Science and Technology, Den Haag, The Netherlands, www.imaging.org/ist/conferences/archiving/index.cfm
- Jun 14-18** **Joint Meeting of ISCC/ASTM E12/CIE Div. 1, Standards: What they are--What will they be?--What should they be?**, Princeton University, Princeton, NJ, isccoffice@cs.com

CALENDAR, Continued

- Jun 14 - 18** **CGIV 2010: 5th European Conference on Colour in Graphics, Imaging, and Vision**, Society for Imaging Science and Technology, Joensuu Yliopisto and University of Eastern Finland, www.imaging.org
- Oct 5-7** **Joint Meeting of AATCC and ISCC, 4M: Multi Media - Multi Material: Color Control**, College of Textile, North Carolina State University, isccoffice@cs.com

COLORCUBES FOR SALE: HANDS-ON TUTORIAL ON COLOR MATCHING AND ORDERING

The ISCC Office has a supply of ColorCube 3D puzzles for sale at a price of \$15 (less than \$29.99, the price on www.colorcube.com) + \$5 S/H. The ColorCube (Spittin' Image Software, US Patent 5,364,795) has two stages of assembly, each of which teaches something different about color. The first is color-matching: each of 64 small cubes is made of two pieces that must be color-matched from a set of 128 pieces. The second is color-ordering: The small cubes assemble into a large 4 x 4 x 4 cube, ordered

according to the percentage of cyan, magenta, and yellow (C, M, Y) colorants in each small cube (white being the base color that makes up the difference between $C + M + Y$ and 100%). The ColorCube is an excellent educational tool, and assembles into a robust and aesthetically pleasing final product. Of course, you can also assemble the cube pieces into other creative designs. The box proclaims: "for ages 10 to 110."



Publications Available from ISCC Office

ISCC 76th Annual Meeting Program and Abstracts, ISBN 978-1-4243-4273-0 \$25.00*

Color and Light by Fred W. Billmeyer Jr. & Harry K. Hammond., III. Authorized reprint from: ASTM Manual 17, Copyright 1996, ASTM International, 100 Bar Harbor Dr., W. Conshohocken, PA 19428.

\$5 ea or 20 copies/\$50.00

Demystifying Color by Bob Chung, 11 pages.
\$5 ea or 20 copies/\$50.00

ISCC 75th Anniversary Commemorative CD and Pin \$30*

Guide to Material Standards and Their Use in Color Measurement (ISCC TR-2003-1) \$50*

*Plus shipping and handling

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\$100 business card-size	\$250 1/4 page
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American Association of Textile Chemists and Colorists (AATCC)
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American Society for Photogrammetry & Remote Sensing (ASPRS)
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Color Pigments Manufacturing Association (CPMA)
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Society for Information Display (SID)
Society of Plastics Engineers, Color & Appearance Div. (SPE)
Society for Imaging Science and Technology (IS&T)
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ISCC IS PLANNING THREE MEETINGS FOR 2010.

MARK YOUR CALENDARS NOW.

ISCC/CORM Special Topics Conference on Lighting in Art, Commercial and Retail Spaces,
National Institute of Standards and Technology, Gaithersburg, MD, **March 2-3**

Joint Meeting of ISCC/ASTM E12/CIE Div. 1, Standards: What they are--What will they be?--What should they be? Princeton University, Princeton, NJ, **June 14-18**

Joint Meeting of AATCC and ISCC, 4M: Multi Media - Multi Material: Color Control,
College of Textile, North Carolina State University, Raleigh, NC, **October 5-7**