



Inter - Society Color Council Quarterly Newsletter

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ISCC Board of Directors Corner

Happy New Year! My name is Jennifer (Jen) Kruschwitz, I am an assistant professor of optics at the University of Rochester's Institute of Optics, and originally from Westwood, Massachusetts. In January of 2020, I started my journey as a member of the Board of Directors for the ISCC, and I am so grateful to be a part of this wonderful organization. Has it really been a year?! Time flies when you are in a perpetual state of lockdown due to a pandemic.

I am sorry to say that I never really thought about color when I was a child. It was only when I learned to sew in middle school and high school in the early 80s that I started experimenting with bold patterns and vivid colors. I made all of my own dresses and formal gowns going forward and into college, always choosing statement fabrics. Whenever I started a sewing project, my college friends chided me by saying, "hide the curtains, Jen is making a new dress!" I decided to become an optical engineer at the University of Rochester (UofR) due to my gift for 3D visualization plus loving math and science as much as I loved sewing.

In 1988, I enrolled in the last colorimetry class taught by Professor David MacAdam. I didn't realize then that color measurement would become immensely important in my future. When I went into the workforce after receiving my BS, I became an optical interference coating (OIC) designer. OICs are multiple layers of thin films deposited on an optical surface (like a lens) that are

used to increase either transmission or reflection in a particular wavelength region. The most popular kind of OIC is called an antireflection coating and can be found on most eyeglass lenses. At my first job, I helped innovate stealth window coatings for the Air Force at Itek Optical Systems in Lexington, MA. Later, I was in charge of over 3500 coated optics for the Omega laser at the UofR's Laboratory for Laser Energetics. After receiving my MS in optics, I worked at Bausch and Lomb in the Thin Film Technology division designing color-correcting cold mirrors and filters for lighting companies such as Osram, Philips, General Electric, and Electronic Theatre Controls (ETC). It was there that my Colorimetry class came in very handy.

After the birth of my first child in 1998, I left industry to start my own consulting firm, JK Consulting. Many lighting and display companies at that time needed an OIC designer with color expertise. In 2007, I was asked to teach a course on OIC design at the UofR as an adjunct, and I caught the bug for teaching. I wanted a full-time gig, but I needed a PhD. I was so fortunate to be accepted into the Color Science PhD program at Rochester Institute of Technology. Dr. Roy Berns was my advisor and I did research on adapting the Kubelka-Munk turbid media theory to traditional paints combined with effect pigments (which are just ground up OICs!). Sparkly paint! For my final dissertation I created a series of micron-sized, metallic-looking, OIC color targets that could be

used to calibrate object color for reflectance microscopy. These targets were akin to an array of spherical effect pigments that did not change color with angle. I earned my PhD in 2015 and started working at the UofR as an assistant professor. I still teach OIC design, and now I offer a course in the spirit of Professor MacAdam entitled Color Technology. In Color Tech my students learn about color spaces, color order systems, color measurement, and color modeling with additive colors from displays as well as subtractive colors from pigments and dyes. I wrote the Field Guide to Colorimetry and Fundamental Color Modeling for SPIE Press in 2018 from my course notes. Later that year I attended the ISCC's Munsell 2018 conference in Boston, MA and was so impressed by the mix of attendees. I have been a member of ISCC ever since, and I am so happy that my career path has been for all intents and purposes color-corrected.



Jennifer Kruschwitz

Table of Contents

ISCC Board of Directors	2
Hue Angles	4
AIC 14th Congress Milan 2021	5
Color Research and Application	9
TAGA Extends Call for Papers	14
Election Results	15
Incoming President's Message	16
Update on the ISCC/AIC Joint Color Literacy Project	17
A Blast from the Past	18
Color Impact 2021 goes virtual!	22
Fluorescent Fridays	23
ISCC Visual Identity Project (VIP)	24
Calendar	36
Sustaining Members	37

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Hue Angles

Ruminations on Eating Photons

Plants see photons.
People see photons.
Plants eat photons.

Do people eat photons? I suspect not. It would be too light a diet.

The above was my first reaction to Carl Jennings's latest column, "Eating Color: Color Perception in Plants" [ISCC News # 492 (2020), pp. 5-8]. Carl wrote from the viewpoint of an artist who embodied the title metaphor in his works. I, of course, tend to pursue more technical implications—starting with a joke. And, unlike all the trite photon jokes I had seen on the Internet, this one seemed to have a serious teaching point.

Let's start with the seeing of photons. The chemistry of vision involves amplifying a rather weak photon signal (weak because it must be divided up in space, time, and spectrum), and the agent of the amplification is the discharge of a battery. When the battery is discharged, it must be recharged (using a lot of metabolic energy) before it can be used again. (Sometimes, as with retinal rods, the battery gets discarded and replaced, not recharged.) Seeing, either by plants or by animals, involves treating the photon as a signal and amplifying that signal chemically. Any vision system, plant or animal, uses energy by combining oxygen with other elements; hence respiration is a prerequisite for seeing.

Now let's proceed to the eating of photons. Photosynthesis also has a battery that is similar to vision's battery, but the energy goes the other way. Not only the photo-active material, but the whole organism

increases in mass and energy as a result of the incident photon energy. Carbon adds to the mass of the organism and oxygen is released.

I've just described the eating of photons by plants. Do animals eat photons in the same way? No, and I think the reason is that animals are not able to use the photons as a direct energy source. They have to eat in other ways, which are familiar to us. Photons are too light a diet to sustain animals directly. [One must note a small exception of this rule, the creation of Vitamin D via the Sun's UV radiation on skin.]

I published a little about this subject in ISCC News # 427 (2007), p.7: "Power to the Pupil" (not a Hue Angles column). There my main focus was the creation of batteries using rather large amounts of visual pigment from animals, and also the design of solar cells using principles very similar to those used in certain cameras.

Some of you might complain at this point about my colloquialism of "seeing photons" in place of "information-processing an electromagnetic signal" and "eating photons" instead of "transmuting electromagnetic power into stored energy." In anticipation of such a complaint, I can only say that less colloquial language might deny me immortality in the immense archives of photon jokes that persist ready for simple Internet search. Enjoy.

Note: I recently learned that Ronald Penrod passed away August 12, 2020 at the age of 80. Ron was a pioneer in digital colorant formulation. His color-science career (1965-1991) was at Uniroyal Inc. (previously U.S. Rubber), where he added commentary and software to Ray Winey's original 1962 report on the colorant-formulation method. This contribution was discussed in Bill Longley's Hue Angles essay, "Color Creeks Ray Winey has Found People Up" (<http://hueangles.blogspot.com/2009/>). MHB

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AIC 14th Congress Milan 2021

August 30 – September 3, 2021

Ca' Granda, Università degli Studi di Milano Via Festa del Perdono, 7 – 20122 Milano, Italy

The logo for the AIC 14th Congress has a unique meaning! It was chosen to represent the outline of Milan's famous Gothic cathedral known as el Duomo, the third largest church in Europe.



El Duomo

<https://www.usatoday.com/story/travel/destinations/2019/05/13/rick-steves-milan-italy-attractions-the-last-supper-duomo-la-scala/1164464001/>

This cathedral was constructed from pink marble, and the color selection for the logo contains some of the hue names that might come to mind as one explores this majestic structure. The Gothic design features pointed-arch windows, statues, little pinnacles, and reliefs. The exterior holds 1,000 large and small carvings, while the interior features another 2,000 sculptures. When you enter, you are struck by the sheer size of the ceiling with pillars about as tall as sequoias. This breathtaking sight is eye candy for all color enthusiasts.

Have you begun thinking about your plans regarding the AIC 14th Congress in Milan, Italy? The Call for Papers is still open. The deadline for paper submission is **March 31, 2021**. Authors are encouraged to submit abstracts using EasyChair at: <https://easychair.org/conferences/?conf=aic20210>

Papers can be submitted on any of the following 12 topics: Measurement/Instrumentation, Digital Technologies, Lighting, Physiology, Psychology, Production/Manufacturing, Restoration, Environment, Design, Culture, Education, and Communication/Marketing. Authors are also invited to submit papers pertaining to any of the following five Special Sessions:

1. Innovation and research in color for beauty care and hairstyle
2. All colors of cinema
3. Color and autonomous driving
4. Light beyond colours: the National Committee-CIE Italy
5. All the recent books on color

Please visit the website at <https://www.aic2021.org/call-for-papers/> for more specifics on how to submit an oral or poster presentation.

The Congress will feature at least nine keynote invited speakers.



Robin Jenkin from NVIDIA Corporation models image quality for autonomous vehicle applications. He is a Visiting Professor at University of Westminster within the Computer Vision and Imaging Technology Research Group. He will give a talk entitled "The Influence of CFA Choice on Automotive and Other Critical Imaging Systems."



Pietro C. Marani is a full Professor in Modern Art History at the Politecnico of Milan. The title of his talk is "Leonardo's Colour Today: From the Dark to the Light."



Luca Missoni, as the Artistic Director of the Missoni Archive, is developing a communication and research tool to valorize the Brand Heritage. He will be giving a talk on "Color in Fashion Design."



John McCann performs research on color vision, photography, and fine art. He is a research scholar who worked at Polaroid for many years. His talk is entitled "Edges in Illumination Control Appearances in HDR Scenes."



Austin Nevin is the Head of the Department of Conservation at the Courtauld Institute of Art in London. The title of his talk is "Conservation Science and Changing Colors – Approaches to Measuring and Managing Change."



Giovanni Pinna has been professionally involved in show business as a lighting designer since 1986. He also teaches at universities in Milan, Venice and Rome. He will discuss "Lighting and Color Design in the Show."



Francesca Valan is an industrial designer specializing in Colors, Materials and Finishes (CMF) Design. She teaches CMF Design at many locations, including Politecnico of Milan. Her talk will deal with "Color in Industrial Design."

More detailed biographies and abstracts for all invited keynote presentations can be found at <https://www.aic2021.org/invited-speakers/>.

The Inter-Society Color Council is a collaborating organization with the Associazione Italiana Colore, the association that is organizing the AIC 14th Congress. We encourage our members to consider submitting an abstract for an oral or poster presentation before the **March 31, 2021** deadline. The Congress will be held using a completely online model and consequently, the registration rates for 5-day attendance have been reduced! The website, <https://www.aic2021.org/> contains more details. So, mark your calendars for a color-filled Olympic-type event like no other from **August 30 - September 3, 2021!**"

Paula J. Alessi,
ISCC Liaison to AIC



Color Research and Application

From the Editor

Vol. 46-1, February 2021

By Ellen Carter

As the new year and volume of Color Research and Applications opens there are some changes in options and format. In the journal, my column has a new name: From the Editor, replacing the 45-year-old "In this issue" tradition. More importantly, there is a new category of submissions, "Applied Theory Article." It is hoped this category will inspire people in the color science fields to submit manuscripts that extend their theoretical developments to applications in one or more of the multitude of industries and application fields where color is integral. "Applied Theory Article" will also replace our past category of "Industrial Applications." Finally, all types of review articles will be lumped into one category simply identified in the category "Review."

Colour Vision Assessment

This issue begins with a trilogy of articles called Colour Vision Assessment. John L. Barbur, Marisa Rodriguez-Carmona, and Benjamin Edward William Evans are the authors of the three articles. Over the years numerous color vision tests have been developed primarily to assess a person's ability to distinguish color, evaluate the change of a person's color vision, and for screening applicants for certain types of jobs where the ability to distinguish colors is a critical requirement. In the first article, Colour Vision Assessment – 1. Visual Signals that Affect

the Results of the Farnsworth D-15 Test by Benjamin Edward William Evans, Marisa Rodriguez-Carmona, and John L. Barbur, the authors introduce many of the techniques of color vision assessment, then focus on the Farnsworth D-15 test to examine the visual signals the observer may use to pass a diagnostic color arrangement test. They found that while the Farnsworth D-15 is primarily used to screen for moderate to severe color deficiency, some subjects with severe color loss can still use combined, residual red/green, yellow/blue and luminance signals to pass.

The second article Colour Vision Assessment – 2. Color Assessment Outcomes Using Single- and Multi-Test Protocols, with Marisa Rodriguez-Carmona as first author, the authors examines how well single- and multi-test color assessment protocols achieve the test objectives and establish how well these protocols serve current needs. In their experiments, the authors investigated 1827 subjects with the Ishihara pseudoisochromatic test plates test, 674 subjects on the Farnsworth Munsell D-15 test, 636 subjects on the City University test (2nd ed.) and 359 subjects on the Holmes-Wright 75 type-A lantern test. They give the results and discuss their conclusions that single and multi-test protocols based on conventional color tests fail

to meet current color assessment requirements.

It should be no surprise that the first two articles lead to a third article, Color Vision Assessment – 3. An Efficient Two-Step Color Assessment Protocol (with John L. Barbur as the first author) in which the authors describe a statistical model to optimize the parameters of a Color Vision Screener test and to predict the limits of what can be achieved in color assessment. The screening test takes less than three minutes. And after screening 84 participants, it was determined to have close to 100% repeatability. They go on to describe an efficient, "two-step" protocol based on the initial use of the screening test followed by full color-assessment of only those who fail the screening.

Image Quality Evaluation for High Dynamic Range and Wide Color Gamut Applications Using Visual Spatial Processing of Color Differences

Electronic images have come a long way in the past 80 years, during the time televisions came into common use. High dynamic ranges and wider color gamut applications have expanded the visual range of images to more than four orders of magnitude, which makes it necessary to find new metrics to evaluate these images. Anustup Choudhury, Robert Wannat, Jaclyn Pytlarz and Scott Daly present Image Quality

Evaluation for High Dynamic Range and Wide Color Gamut Applications Using Visual Spatial Processing of Color Differences. They evaluate a series of color difference metrics on four high dynamic and three standard dynamic range sets of images in publicly available distortion databases consisting of natural images and subjective scores. They compare the scores of seven metrics starting from the traditionally described CIE-based CIE $L^*a^*b^*$ metrics to advanced metrics including a spatial extension to those derived by optimizing the opponent color contrast sensitivity functions including a new one suggested in their article.

Spectral Radiance Reconstruction from Trichromatic Camera Responses based on Orthogonal Test and Regularized Algorithm

The fields of environmental monitoring, textile printing, biomedicine and many others use electronic images for evaluation. Besides examination of the images themselves, it is often desired to gain spectral information about objects within the images for characterizing the physical and chemical properties of the object. A new method of Spectral Radiance Reconstruction from Trichromatic Camera Responses based on Orthogonal Test and Regularized Algorithm is described by Xufen Xie, Jieyu Zhu, Ning Fang Liao, Wenmin Wu, Jing Liang, and Chaoqun Fu. Their method includes two parts of orthogonal test design and a regularized constrained least squares method. Combining both parts, the system spectral radiance reconstruction transformation matrix can be obtained, so spectral radiance data can be reconstructed. Their proposed method can sup-

port scene spectral radiance reconstruction or BRDF estimation from trichromatic imaging systems.

Optimal Spectra for Double Object-Colour Solids

Paul Centore writes about Optimal Spectra for Double Object-Colour Solids. For discussing human vision or imaging systems, people often use the concept of a color solid, which in a diagram of color space indicates the realizable colors that can be seen for a given illuminant. Each illuminant leads to a different solid. The outer edge of the gamut is called the object color solid or illuminant gamut. In this article, Centore discusses his investigation of optimal spectra for double object-color solids; that is, those spectra whose two-color signals (one for each illuminant), when concatenated, appear on the boundary of the six-dimensional double solid. He found that theoretically, there is no maximum number of transitions on optimal spectra for double solids, but practically, spectra with a moderate number of transitions, such as five or six, should provide an adequate approximation in most cases. If more are needed, the approximation can be varied steadily until the result varies as little as desired.

Color Determinants of Surface Stratification

There have been many discussions of advancing and receding color, i.e. red appears closer to the observer than blue. However, artists have used many techniques to express the feeling of depth in paintings, not just hue. Osvaldo DaPos, Dhanraj Vishwanath, and Liliana Albertazzi set up two experiments to explore the role that the different attributes of color, such as hue, chroma and

lightness play in the stratification of surfaces. Their article, Color Determinants of Surface Stratification, reports on these experiments. In the first experiment they tested an elliptical configuration horizontally divided in two parts by a wavy line. In the second experiment, the complexity of the task was increased by having multiple-colored surfaces in a circular configuration and having the observer judge coplanarity locally between abutting pairs of colored surfaces and globally for the whole configuration. They found that for surfaces to appear coplanar, lightness has to be proportional to the natural lightness of their hue, or to the lightness of the centroids of their color category. The dimensions of whiteness and blackness (NCS coordinates) were also tested. They did not find that a unique contribution to the perceived depth stratification of the NCS whiteness/blackness manipulation.

Tactile Colour Pictogram to Improve Artwork Appreciation of People with Visual Impairments

According to the dictionary, art is "the expression or application of human creative skill and imagination, typically in a visual form such as painting or sculpture, to be appreciated primarily for their beauty or emotional power." Color is often an important facet of art. But people with vision deficiencies often are less able to enjoy the color in art. In their open access article, Tactile Colour Pictogram to Improve Artwork Appreciation of People with Visual Impairments, Jun Dong Cho, Oh Uran, and Do Won Lee introduce the recent efforts to add color to the developing tactile technologies that may enhance a visually impaired person's appreciation

of artwork through touch. They describe three tactile color patterns based on pictograms and present their design methodologies. To evaluate the performance of the tactile color patterns, four experiments involving 23 visually impaired adults were performed: 1) quantitative user experience evaluation; 2) pattern preference test of chroma and value; 3) identification test, and 4) a test on geometric and physical characteristics of each pattern as well as feedback from each observer in each test. The user experience showed the effectiveness and helpfulness of the tactile color patterns.

Influence of Chromatic and Lighting on the Visual Environment of the Elderly: A Critical Literature Review

With the increasing number of people world-wide who are living to and well beyond the age of 65, adapting the environment for those over 60 has become a national issue for public policy. Good lighting, which includes paying attention to its chromatic quality, can improve vision, reduce falls, improve mood, contribute to feelings of security, and improve sleep and the quality of the circadian cycle. The article *Influence of Chromatic and Lighting on the Visual Environment of the Elderly: A Critical Literature Review* by Estelle Guerry, Céline Caumon, Elodie Bécheras, and Georges Zissis provides the background necessary for collaborative work between the human and social sciences and the engineering sciences to attain the goals of improving general living conditions and restoring autonomy to seniors. These themes, which are covered in the 44 references, draw up a range of non-pharmacological solutions that can be deployed both at home and in institutions.

Carefully designed lighting can generate benevolent atmospheres; the common objective of these recurring themes is the desire to improve general living conditions and restore autonomy to seniors.

Colour Here, There and In-Between – Placemaking and Wayfinding in Mental Health Environments

As Fiona McLachlan and Xuechang Leng, the authors of the next article, explain that color design in mental healthcare environments is acutely significant. However, following the published recommendations on this topic in a dogmatic, risk-averse manner and predominately without professional design input, has often led to monotonous and under-stimulating environments. Their open access article, *Colour Here, There and In-Between – Placemaking and Wayfinding in Mental Health Environments*, presents two studies that are examples of practice-led applied research within occupied healthcare facilities. The studies suggest upgrading the décor by considering the role of color as part of the everyday experience of listening to the input of all the users of the facility. In addition to improving the facility interiors, these projects showed the potential for education in color design, through engagement of design students in live projects. The focus on specific, concrete problems demonstrated the transformational potential of color on people's everyday experience of space, and increased awareness of the need for design knowledge to be developed and applied in practice.

Evolution and Human's Attraction and Reaction to Colour – Food and Health

In John Hutchings' article, *Evolution and Human's Attraction and Reaction to Colour – Food and Health*, he briefly discusses two evolutionary stories. The first story involves the natural evolution of food pigments which are vital to our health. The second story commences with the arrival of human beings and their eventual ability to control fire leading to the development of food preservation, processing and more recently, ultra-processing. Color unites both stories – in the first food pigments have colors that help us to recognize edible plants and also to recognize when they are ripe or when cooked items are ready to eat. Later, man learned to create artificial color, which can attract us, but distract us from good diets. Hutchings concludes that using color helps us to select meals for our diet from a wide dietary range of visually attractive products that stimulate a healthy appetite. But he also warns that artificial color can also lead us astray. We have options that determine whether we eat healthily, or not.

Preference for Luminance Uniformity of Refrigerator Lighting

While on the topic of foods, the next article examines the lighting issues in refrigerators. In the modern world, refrigeration has become widely used as a means of preserving food until we are ready to eat it. Therefore, being able to look quickly and accurately at the food stored in refrigerators is important. Kyeong Ah Jeong and Hyeon-Jeong Suk investigated minimally required uniformity of refrigerator lighting for comfortable use while maintaining

the perceived lighting quality. In Preference for Luminance Uniformity of Refrigerator Lighting, they report that although the presence of stored items affects the threshold, considering the role of refrigerators, at least 71% uniformity was required for refrigerator lighting to be perceived as acceptable, and 80% was required for perceptions of uniformity. This is consistent with standards for lighting uniformity values suggested in several other international lighting guidelines for other indoor activities.

The next five articles are concerned with color preference and its application in artwork.

Analysis of Experiments to Determine Individual Colour Preference

Luwen Yu, Stephen Westland, Zhenhong Li provide an Analysis of Experiments to Determine Individual Colour Preference. When trying to study topics such as a person's preference for various colors, there are many options that the researcher needs to consider in the design and execution of their study. Yu, Westland, and Li discuss factors such as experiment environment (online vs. in the laboratory), selection of participants (including number, observer characteristics – sex, nationality, age, etc.), research methods such as forced choice or ranking, and so on. Then in the analysis of two parallel experiments, they show the pros and cons of these various design choices.

A General Framework to Study the Price-Color Relationship in Paintings with an Application to Mark Rothko Rectangular Series

People throughout the world flock to Museums, Art Shows, and the like to enjoy the beautiful produc-

tions by famous artists. However, to a certain extent people express their appreciation of a piece of art by the amount of money they are willing to pay to own the piece of art. In A General Framework to Study the Price-Color Relationship in Paintings with an Application to Mark Rothko Rectangular Series, Ventura Charlin and Arturo Cifuentes looked at the influence of color in the purchase prices of Mark Rothko paintings sold at auctions during various time periods. They analyzed four key color aspects: dominant colors, features of the color palette, color harmony, and color emotions to see if and what affect these had on the purchase price. Then they propose a new metric based on the Herfindahl index to describe color diversity; this metric seems promising for characterizing the effect of the color palette on the price of a painting.

Characterization of Spray Paints Used in Street Art Graffiti by a Non-Destructive Multi-Analytical Approach

Another place that more recently has become an exhibit area for art to be appreciated by the public is on outer walls in highly populated areas such as cities. What may have grown from graffiti has become a genre of graffiti street art. Graffiti murals and paintings are starting to become part of our cultural heritage. Whether it is for preservation of the artwork or for removal of the graffiti, it is necessary to know the components of these newly developed paints. Therefore, Ioana Maria Cortea, Lucian Ratoiu, and Roxana Radvan investigated a large number of commercially available spray paints, specifically designed for graffiti street art and mural use. Their article Characterization of Spray

Paints Used in Street Art Graffiti by a Non-Destructive Multi-Analytical Approach reports on the non-destructive approach that included: X-ray Fluorescence, Fourier Transform Infrared Spectroscopy, spectrophotometry and Hyperspectral Imaging. The study offers new insights into the chemical characterization of these less studied types of materials, recently introduced within the art-world. It also provides registered data sets as the groundwork of a compositional spectral library that could help future investigation-al studies of graffiti art materials.

Classification of Persian Carpet Patterns based on Quantitative Aesthetic-Related Features

Persian Carpets, have been highly prized over the centuries for their aesthetic beauty, and therefore should be considered another category of artwork. The carpets with unique features have been created and known with their exclusive patterns in the world. In the Classification of Persian Carpet Patterns based on Quantitative Aesthetic-Related Features, Tayebe Soleymanian Moghadam, Mansoureh Ghanbar Afjeh, and Seyed Hossein Amirshahi used the aesthetic related features to differentiate between different Persian carpet patterns consisting of a wide range of designs and different color harmonies. Following an earlier method of categorization, which had been used when evaluating paintings, i.e., to use the distribution of local gradients and image edges to describe the shape of images, they then created a pyramid of histograms obtained by implementing this method on the different spatial levels of the rug images. Four aesthetic related metrics (complexity, anisotropy, self-similarity

and Birkhoff-like) were extracted for each rug sample. They found that the combination of anisotropy and Birkhoff-like indices was able to describe different types of Persian carpets designs adequately. This confirmed that these aesthetic features could be successfully used as suitable features for the categorization of Persian carpet patterns.

Pattern-Driven Color Pattern Recognition for Printed Fabric Motif Design

In the textile and clothing industries fashion changes quickly and it is vital that designers can produce new and appropriate designs for the fabric decoration. Often the user has ideas about what they would like developed. Dejun Zheng's goal is to provide a color pattern recognition method based on structural and elemental similarity patterns for quickly generating new motif patterns of printed fabric. In Pattern-Driven Color Pattern Recognition for Printed Fabric Motif Design, he describes a novel framework for automatic design of color patterns in real motif images. The pattern search procedure uses recognition of an underlying color pattern element using a novel, efficient color feature encoding method. Color pattern feature matching, segmentation and indexing techniques are then used to locate and replace the elements in the motif unit image with similar elements in the database to provide the new design according to the color and design preferences of the customer.

Roadmap of Moving Urban Colour Towards Cultural Sustainability in China

China is the largest country in the world with a population approaching 1.5 billion people. There has been a rapid growth of urban areas.

In recent years, there has been a focus on aesthetic value and cultural heritage. Color occupies a crucial position in applied aesthetics, and China has gradually been stimulating the quality of urban beauty through urban color. In the review "Roadmap of Moving Urban Colour Towards Cultural Sustainability in China," Zhengping Xu and Xing Zhen sum up how China's existing urban color planning documents attempt to achieve sustainability through a framework of systematism, regionalism, life cycle and management. Planning documents are classified into three different scales 1) general planning proposing an overall urban color structure according to the existing urban patterns, 2) detailed planning paying more attention to the urban conservation area and highlight the regional history and culture, and 3) specialized planning where the urban color is creatively applied to urban renewal, cultural heritage conservation, and urban characteristics expression to promote the sustainable development of urban space. The planning principles proposed in this article also provide valuable opinions for world problems related to the sustainability of urban color.

Study of the Color Characteristics of Residential Buildings in Shanghai

Shanghai is one of the Chinese cities that has received a lot of attention as an old city that is now evaluating city planning and renovations. In the article Study of the Color Characteristics of Residential Buildings in Shanghai, the authors, Jiangbo Wang, Lingyun Zhang, Aiping Gou, explain the evaluation factors for their research. Suggestions regarding the different evaluation grades of color construction are

offered, and a theoretical basis for the next step in the planning practice is provided. The research results provide theoretical support for the forward-looking and scientific nature of color planning for residential buildings in the future and can serve as a reference for the selection of the main colors of building walls.

Analyzing a Decade of Colors of the Year

In the year 2000, Pantone introduced the Color of the Year and the practice has grown throughout the years. Twenty years later Arjan Gijzen, Marjan Vazirian, Eric Kirchner, Peter Spiers, Peihua Lai, Stephen Westland, and Pim Koeckhoven collected the Color of the Year choice for 15 paint and coating companies. In Analyzing a Decade of Colors of the Year, they looked for trends, and tested whether the choices seemed to be random. They found that colors of the year differ significantly from what can be expected if colors of the year would be selected randomly. They found lots of similar colors and some very unique colors. They also discuss factors that may go into the selection of different colors.

CIE 241:2020 Recommended Reference Solar Spectra for Industrial Applications

The issue closes with a brief announcement about the new publication from the International commission on Illumination. CIE 241:2020 Recommended Reference Solar Spectra for Industrial Applications contains a large selection of simulation benchmarks for total, direct and diffuse components of solar spectra under various atmospheric conditions and solar geometries.

TAGA Extends Call for Papers Deadline



The Technical Association of the Graphic Arts (TAGA) has extended the deadline for papers to be considered for publication in its 2021 TAGA Proceedings. Individuals must submit a 500-1500-word abstract to tagapapers@printing.org by the new deadline of February 15, 2021.

Papers can focus on scientific research or technical innovation in printing, graphic communications, and related industries (color-related topics are eagerly sought). Authors whose papers are accepted for publication also have the option of providing a video presentation of their research. More information is at www.taga.org/call for papers.

ISCC quarterly newsletter **15**
issue 493 . Winter , 2021

Executive Committee:



Two new Board of Directors members:



A man with a beard and glasses, wearing a striped shirt, sitting in an office chair. He is looking directly at the camera with a slight smile. The background shows an office environment with shelves and papers.



A portrait of a smiling woman with short brown hair and glasses, wearing a blue sweater, sitting in front of a window.

Congratulations and thanks to our new officers and directors! Contact information for all board members is on page 3 of this newsletter. Our officers serve for two years, ending in December 2022, and Directors serve three year terms, ending in December 2023 for these newly-elected Board members

Thank you to outgoing Officers Renzo Shamey, President, who will continue as Past President. Jerry Dimas, Past President, who was elected as Treasurer; and Frank O' Donnell, Treasurer, who is retiring from the Board.



Incoming President's Message

Dr. David R Wyble

President, Inter-Society Color Council

My name is Dave Wyble, and I come to you as the incoming President, as of January 1, 2021. I succeed Renzo Shamey, who stays on the Executive Board as Past President, and welcome Maggie Maggio to the board as President-elect. I would like to thank Renzo for his tireless service, and for leaving the Council in very good standing. And I would also like to thank Maggie for stepping up to the six-year commitment that is the presidential sequence (two years each as President-elect, President, and Past President). For background about me, please refer to the Board of Directors' Corner, published in [issue 474, Spring 2016](#). The balance of this article will be sharing a few ideas about where I see the Council moving over the next few years.

If there was to be a simple summary of where I think we are heading, it would be "Foster connections with the membership." Let's tease that apart. The first question might be "What connections?" One result from the member survey (reported at our October Annual Meeting) was that members want to connect with other members in two primary ways: as colleagues (collaboration) and as mentors (education). And while it may seem obvious to ask "What is our membership?" I do not want to imply that our plans are just for the list of members we have today, but we also need to consider the growing list which includes the membership of tomorrow.

Finding new ways for the organization to connect with people is strongly related to how we market the Council. Some discussion has already taken place, but the particulars (and the people to do them) are still being formed. We already know that one important aspect is increasing our social media presence. For too long we have had a very "hit-or-miss" approach, but we will soon have a team together to present a cohesive and consistent message across the major platforms. This message will be guided in part by a membership team who will work to understand the underlying themes of what drives members to join, and how to get them to stay engaged. Our hope is that this will open some doors that will lead to increased collaborations across the membership, and indeed across the great color community.

To continue moving our educational mission forward, we will be presenting topical webinars as we have for the last five years. But formal webinars are only a part of our online educational programs. Elsewhere in this newsletter you can read about Fluorescent Fridays, a student-centered program, as well as Conversations in Colour, which will take the form of a more relaxed discussion. And of course, historically one of our primary educational means has been through our meetings. You will hear much more soon about our June Annual Meeting which will

again be 100% online, with a full program of engaging speakers and activities.

Finally, we are reminded that the color community spans the globe, and in 2021 we will begin planning in earnest the 16th Congress of International Colour Association (AIC). As the US national representative to AIC, we have always supported the meetings and congresses, but in 2025, we will again host the Congress here in the US. The last time we hosted this meeting was the 9th Congress in Rochester NY, in 2001, and before that in Troy NY in 1977.

One important thing to not take away from this article is any misconception that the efforts I have described here are intended to replace any current programs. To implement these ideas will not require us to tear down anything, but it will require some additional help. If you can see yourself as assisting with any of the above programs or ideas, I would encourage you to contact me or any other member of the Board of Directors. Our contact information is on page 3 of this newsletter. I am sure that you have much to offer, and I hope we will count you as a participating member soon if we do not already.

We are going to have a busy few years ahead of us, and we look forward to continuing with the current teams and adding additional participants wherever we can.

Update on the ISCC/AIC Joint Color Literacy Project

The Color Literacy Project (CLP) launched Phase Two in January 2021.

The goal of the second phase is to develop an inter-disciplinary program for teachers interested in expanding their knowledge of both the art and science of color for use in the classroom. (The final program will be targeted to K-12 teachers but available for university teachers as well.)

As part of the program, CLP will test prototype materials and resources designed for educators to explore foundational color concepts at the adult level. Once teachers complete the program they will be encouraged to develop age-appropriate curricula for their specific classes and provide feedback to the project committee.

WHAT to teach the teachers? The cornerstones of the scaffolded, foundational program are:

- Perceptual Color. What is color? What is color for? Color as the complex interconnection of light, material, eye and brain.
- Experiential Color. Observing and describing the colors around us. Judging and identifying color differences. Color sorting and matching. Color attributes and ordering of color in 3D models.
- Relational Color: Exploring color in context. Experiments to understand color relationships.
- Measurable Color. Comparison of additive, subtractive, and partitive mixing. Device dependent color systems. Color measurement systems.

HOW to teach the teachers? The program will model methods for guiding color explorations by providing opportunities for learning about color through a hands-on, experiential approach.

The program will be divided into a series of workshops. For each workshop, the CLP will:

- Select, or design, hands-on exercises
- Prepare a mini-glossary of foundational color terms
- Prepare educational resources and materials
- Provide a list of supplies and tools
- Define the competencies for participating teachers

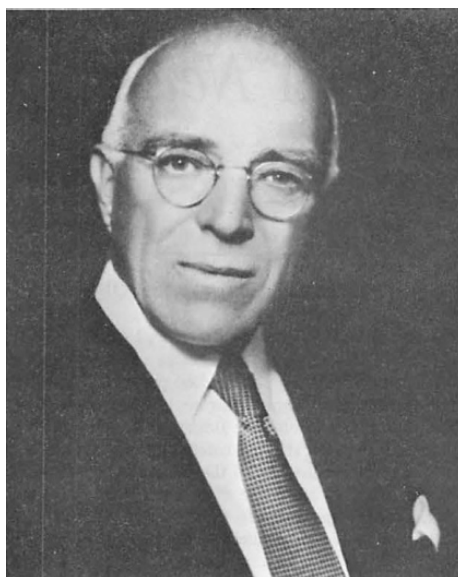
We are currently working with coordinators at four K-5 elementary schools who have volunteered to be beta test sites for the prototype version of the program. The first teacher training workshops will be held in March and April of 2021. Stay tuned for the results!

A Blast from the Past: ISCC Newsletters 50 Years Ago

ISCC Newsletter No. 211 March-April 1971

History of the Formation of ISCC

I am thrilled to bring you a summary of the remarks made by our dear friend and mentor, Dorothy Nickerson at the 1971 ISCC Annual Dinner. That evening, they were celebrating the 40th Annual Meeting of the Inter-Society Color Council (ISCC). I want to share it with you now so that you can all have a better appreciation for the roots upon which the ISCC was built in 1930. Sometimes a look at the past gives us a better perspective on where we are today and where we may choose to go in the future. Dorothy's talk highlighted the accomplishments of seven men who struggled through some hard and frustrating work with many differing opinions and backgrounds related to color, but persevered due to dedication "to finding the answers and to providing a means for disseminating the resulting information." Professor Edmund Norris Gathercoal, Royal Bailey Farnum, Alex E. O. Munsell, Charles Bittinger, M. Rea Paul, Irwin G. Priest and Loyd A. Jones were "responsible for the birth and early growth of this Council."



Professor Edmund Norris Gathercoal

Edmund Norris Gathercoal was a professor of Pharmacognosy (i.e. the study of medicinal drugs obtained from plants and other natural sources) at the University of Illinois School of Pharmacy. His interest in color was sparked by seeing the term "blackish-white" in the 1921 U.S. Pharmacopoeia and National Formulary. Since Professor Gathercoal was responsible for preparing the 10th revision of that formulary, he knew he needed to learn more about color names. As Gathercoal researched issues with color names, he discovered that other sciences and industries were plagued with the same dilemma of understand-

ing vague color naming terms. In May of 1930 at the U.S. Pharmacopoeia Convention, Gathercoal arranged a meeting and color exhibit to address color naming issues. Interested participants were given a 90-page circular containing descriptions of the color naming problems across art, science and industry disciplines with a listing of the exhibits featured at the convention. The result of this meeting was a 12-person committee named to organize "A National Color Convention." At the National Color Convention, it was discovered that challenges in understanding color across disciplines involved more than just color naming issues. That was just the beginning. For the next few years, Gathercoal worked diligently with his 11 colleagues to form the Inter-Society Color Council. The first chairman was Professor Gathercoal at the first ISCC Annual Meeting on December 29, 1931. In Dorothy's words, "We owe Prof. Gathercoal much gratitude, for without his unflagging purpose, his good judgment, and calm appraisal of conflicting proposals, the organization proposed in those early days might have died aborning".

Another member that Dorothy highlighted was Alex E. O. Munsell, the son of Professor Albert H. Munsell. In 1930 as part of his dealings with the Munsell Color Company, Alex was actively interested in doing everything he could to support color education. He became Secretary-Treasurer of the 12-person committee formed at the Pharmacopoeia Convention. He was also an active member of the Optical Society of America. He worked with Priest and Paul across different fields of color to help develop what they thought would be the most useful form of a multi-disciplinary color group in the United States. Alex Munsell was the first Treasurer of the newly formed ISCC and he became the second Chairman after Gathercoal in 1933.

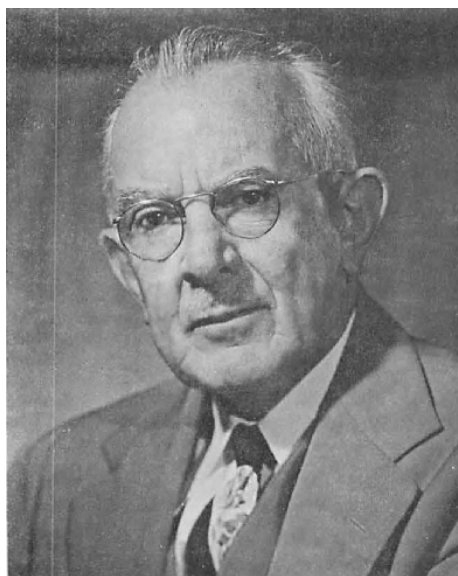


Irwin G. Priest

Irwin G. Priest, chief of colorimetry at the National Bureau of Standards, was the chairman of the Optical Society of America delegation that attended the National Color Convention. He declined an invitation to join the organizing committee but was instrumental in the development of the ISCC original mission. He felt very strongly that formation of a general national color council was needed to "provide counsel, discussion, cooperation, and joint meetings of member societies" acting as a "common forum for exchanging ideas." Priest was clear that he did not want an organization that would settle or make declarations from

individuals without consulting member societies. He was not in favor of a voluntary council with individual members who would not necessarily be aligned with a unified purpose. The National Bureau of Standards supported Priest's principles by widely distributing a memorandum he wrote to many industries across the U.S. and to a few specialists asking for their support in forming a national color organization of groups and societies rather than individuals. The response was overwhelmingly in favor of a color council of member organizations (later to be called member bodies) rather than one of individuals. Unfortunately, Priest suffered heart issues and passed away in 1932 "depriving ISCC of further advice and leadership" from him.

Finally, Dorothy mentioned Dr. Loyd A. Jones, chief physicist from Eastman Kodak Research Laboratories. As President of the Optical Society of America (OSA) in 1930, Jones received a report written by Priest, Judd and Bittinger regarding the need for formation of a national color council



Loyd A. Jones

whose membership would be comprised of officially designated representatives from national societies and associations interested in the description and specification of color. Jones wrote a letter describing the OSA position on the formation of the national color council to Professor Gathercoal. The OSA was so interested in this topic that they hosted a preliminary conference on February 26, 1931 in New York City with the purpose of "organizing an Inter-Society Committee on Color Specification." Dr. Jones was acting chairman of the meeting attended by 30 representatives from 13 national organizations and 17 individuals.

They agreed to form an organization known as the Inter-Society Color Council (ISCC). Another action item was to send a request to national color-interested associations for the appointment of delegates to be sent to the first ISCC organizational meeting. So, on September 21, 1931 at the Museum of Science and Industry in New York City officers and counsellors were elected to serve and write a constitution and by-laws for governing ISCC with instructions to provide for more than one membership class. The first official ISCC meeting under Chairman Gathercoal and Vice Chairman Jones was held on December 29, 1931, which brings this historical account full circle. If you would like to read more of the information on the remaining three pioneers mentioned in Dorothy Nickerson's talk, please go to Newsletter No. 211 from 1970 at <https://iscc.org/Newsletter> .

At ISCC's 40th anniversary, Dorothy felt that it was important to remind ISCC members of the circumstances under which ISCC was founded. She did this by stating the Aims and Purposes upon which they were still operating in 1971: "to stimulate and coordinate the work being done by various societies, organizations and associations leading to the standardization, description and specification of color by the various societies, organizations and associations, and to promote the practical application of these results to the color problems arising in science, art and industry." It was an organization of member bodies (i.e. societies, organizations and associations) interested in color with some individual members as well. They spent 40 years pioneering systems for color specification, color measurement, color naming, color order, color matching, color difference, etc. Here we are some 90 years later and we have become an organization of individuals aligned according to the following Aims and Purposes:

- To stimulate and coordinate the work being done by the various members leading to the description and specification of color by those members.
- To promote the practical application of this work to the color problems arising in science, art, history, and industry, for the benefit of the public at large.
- To promote communications between technically oriented specialists in color and creative workers in art, design, and education, so as to facilitate more effective use of color by the public through dissemination of information about color in both scientific and artistic applications.
- To promote educational activities and the interchange of ideas on the subject of color and appearance among its members and the public generally.
- To cooperate with other organizations, both public and private, to accomplish these objectives for the direct and indirect enjoyment and benefit of the public at large.

Today's Aims and Purposes differ from those developed in 1931 in that member bodies are cooperative societies as mentioned in the fifth bullet, and they account for a much smaller portion of our membership. We have slowly evolved into an organization of individuals over recent years as our member bodies have matured to a point where they no longer require as much color assistance from an organization like the ISCC. Individuals working in all types of fields where color is a part of what many do in art, industry and science are now the lifeblood of ISCC.

Also, in the 21st century, we now live in a world of social media where you can get the answer to any color question you may have by doing a search on your computer. Those searches can be 100% accurate or they can contain some disinformation. Some of our members, especially those involved with the Color Literacy Project, are working to help correct the disinformation, especially in the color education field.

I hope this look back at our origins gives you an appreciation for the 90-year evolution of the Inter-Society Color Council!

Paula J. Alessi,
Senior Color Scientist

Color Impact 2021 goes virtual!

Color in the Built Environment

Sunday, June 13 to Tuesday, June 15, 2021

Due to the continuing uncertainty surrounding COVID-19, the joint committee of the ISCC and the International Association of Color Consultants - North America (IACC-NA) made the tough decision to cancel our contract at Yale University and shift the conference to a fully online format.

The three-day Color Impact 2021 conference will open on Sunday, June 13, 2021 and run through Tuesday, June 15. We are happy to announce that all but a few of the speakers from the original on-site program have agreed to give virtual presentations. The theme of the conference is "Color in the Built Environment." Each of the five half-day sessions features an invited keynote speaker and presentations by color colleagues in urban planning, architecture, interior design, lighting, and materials.

In addition to the conference, the ISCC will host a second ISCC Virtual Symposium on Color Education on Saturday, June 26, 2021. This one-day event will feature a number of presenters who were originally scheduled to speak at Yale as well as additional speakers on the topic of "The Future of Color Education." The Symposium program will also include an update on Phase Two of the ISCC/AIC Joint Colour Literacy Project.

The schedule, program, and registration information for both events will be posted on the Color Impact 2021 website at: www.colorimpact2021.com

by Maggie Maggio

Fluorescent Fridays

The ISCC is creating Fluorescent Fridays for university students from all disciplines (including the Sciences, Arts, Design, Communication, Humanities, and Social Sciences) to network with fellow students, researchers, university professors, and industry professionals and to explore cutting edge information about the nature of color and its applications in the world.

We encourage the exchange of evidence-based research in an interdisciplinary format of discussions, interviews, and papers. One of the goals is to create an online Q & A platform for students to continue conversation, review additional materials, and check out new resources.

FF #1 - Friday, November 13: How Do You Organize Your Crayons, the inaugural FF event, was attended by an international group of students and colleagues. Special thanks to panelists John Seymour, Ann Laidlaw, and Mary Mellow for their inspiring presentations!

For 2021, we are in the process of creating the next two events. Stay tuned for updates about the topics and guest speakers. Here's what we have so far...

FF #2 - Friday, February 26, 2021: In celebration of Valentine's Day, the focus of this event is Seeing Red – What is the Perfect Red? Following an introduction to the concept of unique hues, presenters from a variety of disciplines will share their perspectives on how red is defined in their field of expertise. Speakers TBA.

FF #3: Friday, April 23, 2021: This event is being planned as a rapid-fire five-minute-per-speaker style event to showcase the diversity of student research in color from both the arts and sciences. Speakers TBA.

Planning team: Jean Hoskin, Maggie Maggio, John Seymour, Mike Murdoch, Lina Cárdenas, Luanne Stovall, Jennifer Kruschwitz

**FLUOR-
ESCENT
FRIDAYS**

ISCC Visual Identity Project (VIP)

The board recently decided that it's time to bring the ISCC's image into the 21st century! A team was formed to shepherd a student design competition to define our visual identity, which includes not only a new logo, but our overall graphic presence on the website and social media (LinkedIn, Instagram, Facebook).

As we developed the guidance for students, the team went through a process of defining who we think the ISCC is as an organization, and we want to share it with you and invite your comments. We have created a web page for the Visual Identity Project (under the Members tab) which includes a short presentation explaining the branding process and introducing the current "brand statement" featured at the end of this article. You may have already received the link in Dave's most recent email communication, but for an explanation of how we arrived at this Brand Statement, please visit <https://iscc.org/Visual-Identity-Project/>

Competition guidelines will be published by the end of January 2021 so that faculty members have time to prepare for its inclusion as a Fall 2021 project, a common practice in design education. We will announce the winner at the end of 2021. To invite wide participation in this project, we ask for your input on faculty or programs you think should know about this competition. You can email us at iscc.visual.identity@iscc.org

Finally, we're excited to announce that members have a "VIP" invitation to attend finalist presentations of their design projects which will be held virtually (of course!) in December 2021. Not only will the jury make its decision, but we will also have a People's Choice Award where you can weigh in on who you think best hit the mark in articulating the ISCC's Visual Identity.

We look forward to hearing from you and will keep you informed as the project moves forward!

Team: Luanne Stovall, Lina Cárdenas, Maggie Maggio, Ellen Divers, and Viviana Buvinic Ruz (student)

Calendar 2021-2022

2021	
Feb 3	ASTM E12 Color and Appearance Committee Virtual Meeting Info: https://www.astm.org/MEETINGS/filtrexx40.cgi?+-P+MAINCOMM+E12+future-meetings_maincomm.frm
Feb 4	CMG Colorchat™-zoom Info: https://colormarketing.org/event/colorchat-zoom-feb-4/
Feb 8-10	16th International Conference on Computer Vision Theory and Applications Info: http://www.visapp.visigrapp.org/Home.aspx
Feb 10	AATCC Efficacy Testing of Antimicrobial Personal Protective Equipment (PPE) Info: https://www.aatcc.org/events/
Feb 15	ASPRS Annual Conference Abstracts Due Info: https://www.asprs.org/event/asprs-annual-conference-abstracts-due
Feb 18	Overview of Color and Colorants for Textiles Info: https://www.aatcc.org/events/
Mar 2-3	CMG 2021 Virtual ChromaZone® European Region Info: https://colormarketing.org/event/chromazone-march-2-and-3-europe/
Mar 11	TAGA Presents Info: https://www.taga.org/taga-presents/
Mar 11-12	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/cmg-virtual-chromazone-march-11-12/
Mar 16-17	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/virtual-chromazone-march-16-and-17/
Mar 19-21	CSA National Conference "Colour Connections", Sydney, Australia Info: https://coloursociety.org.au/event-3844772?CalendarViewType=1&Selected-Date=3/27/2021
Mar 23	TAGA Presents Info: https://www.taga.org/taga-presents/

Mar 25-26	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/virtual-chromazone-march-25-and-26/
Mar 29-30	ASPRS 2021 Annual Conference Info: https://www.asprs.org/event/asprs-2021-annual-conference
Apr 7-8	CMG 2021 Virtual ChromaZone® Asia Pacific Info: https://colormarketing.org/event/virtual-chromazone-april-7-and-8-asiapac/
Apr 7-8	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/virtual-chromazone-april-7-and-8/
Apr 14-15	CMG 2021 Virtual ChromaZone® Latin America Info: https://colormarketing.org/event/virtual-chromazone-april-14-and-15/
Apr 20-21	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/virtual-chromazone-april-20-and-21/
Apr 29-30	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/virtual-chromazone-april-29-and-30/
May 4-5	New York Society of Cosmetic Chemists Supplier Day Info: https://nyscc.org/suppliers-day/
May 11	AATCC Committee Meetings Info: https://www.aatcc.org/events/
May 11-12	CMG 2021 Virtual ChromaZone® Latin America Info: https://colormarketing.org/event/virtual-chromazone-may-11-and-12/
May 13-14	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/cmg-virtual-chromazone-may-13-and-14/
May 18-19	NAPIM Digital & Emerging Technologies Conference Info: https://www.napim.org/index.php?option=com

May 20-21	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/cmg-virtual-chromazone-may-20-and-21/
May 25-26	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/virtual-chromazone-may-25-and-26/
May 26-27	CMG 2021 Virtual ChromaZone® European Region Info: https://colormarketing.org/event/chromazone-may-26-and-27-europe-2/
Jun 10-11	CMG 2021 Virtual ChromaZone® North America Info: https://colormarketing.org/event/cmg-virtual-chromazone-june-10-and-11/
Jun 13-15	Color impact 2021 for the Built Enviroment Info: https://colorimpact2021.com/
Aug 23-25	Techtextil, North America, Raleigh, NC, 2021 Info: https://techtextil-north-america.us.messefrankfurt.com/us/en.html?us/en.html
Aug 3-Sept 3	AIC 2021 14th Congress Info: https://www.aic2021.org/program-at-a-glance/
Jun 19-25	CVPR Virtual Info: http://cvpr2021.thecvf.com/
Jun 19	Virtual New Trends in Image Restoration and Enhancement workshop and challenges on image and video processing Info: https://data.vision.ee.ethz.ch/cvl/ntire21//
July 19-23	OSA Optical Sensors and Sensing Congress Info: https://data.vision.ee.ethz.ch/cvl/ntire21//
Aug 2-6	NAPIM Summer Courses Info: https://www.napim.org/index.php?option=com_jevents&task

Aug 6-7	Illuminating Engineering Society Annual Conference Info: https://www.ies.org/events/annual-conference/
Aug 5-7	Illumination Engineering Society Annual Conference, New Orleans, Louisiana Info: https://www.ies.org/events/annual-conference/
Aug 30-Sep 3	AIC 14th Congress Milano, Italy 2021 Info: https://www.aic2021.org/
Sept 10-11	SCAD 2021 Annual Conference Info: http://www.scadent.org/events/chicago-2021
Sept 19-22	SPE CAD RETEC Color On My Mind Info: Coloring the World of Plastics™ https://specad.org/cad_retec_2021_homepage/

Sustaining Members

Sustaining members of the ISCC are organizations who support the mission and goals of the ISCC through financial or other support. With our member bodies, Sustaining Members also provide a critical connection to the color community. If you feel your company or organization should support the ISCC in this way, please contact the office for more information about member benefits.



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ISCC would like to thank the following people for volunteering their time and talents to make this issue.

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isccoffice@iscc.org

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Quarterly Newsletter

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