clinical relevance for researchers & scientific relevance for clinic ans Extravaganza

8<sup>th</sup> Annual Conference of the Society for Color and Appearance in Dentistry (SCAD)

> September 15-17, 2016 Radisson Blu Aqua Hotel, Chicago, IL www.scadent.org info@scadent.org

SCAD Society for Color and Appearance in Dentistry



## Extravaganza

8th Annual Conference • Radisson Blu Aqua Hotel, Chicago, September 15-17, 2016

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#### **Recommended Attire**

Welcoming reception and educational sessions: Business casual President's Dinner: Black tie optional

The formal continuing education programs of VITA North America are accepted by AGD and ADA CERP for Fellowship/Membership credit. The current term of acceptance extends from 7/1/2013 to 7/1/2017. This activity is designated for 16 continuing education credits.



The 8<sup>th</sup> Annual Conference of the Society for Color and Appearance in Dentistry (SCAD) will comply with appropriate disclosure policies as set forth by the American Dental Association's code of ethics and professional standards. The SCAD speakers will verbally disclose any material, financial or other relationships that pose a potential conflict of interest. Speakers will also disclose any unapproved use of products or devices that they will be discussing. Disclosure requirements are not intended to imply any impropriety, but rather to inform the audience that they exist.

#### Contact info:

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## A Message from the President



Dear Colleagues,

The Executive Board of the Society for Color and Appearance in Dentistry (SCAD) cordially welcomes you to our 8<sup>th</sup> Annual Conference at the Radisson Blu Aqua Hotel in Chicago, IL on September 15-17, 2016.

As in previous years, our 2016 Annual Meeting features a full program of high-quality, evidence-based information on color-related and appearance topics in dentistry, presented by outstanding national and international experts and leaders in their fields. Detailed information about the presenters and their topics, including educational objectives, is provided in this brochure. The program will provide up to 16 CE credit hours.

Our poster session will be an additional valuable source of evidence-based information. We will announce the 2016 recipients of SCAD VITA Awards for Excellence in Research Related to Color and Appearance in Esthetic Dentistry (open to pre-doctoral students, graduate students, and non-tenured junior faculty). We will also announce the 2016 recipients of Larsen-Chu Award for Excellence in Dental Technology.

We cordially invite you to join us at SCAD 2016!

Dan Nathanson, DMD, MSD President, SCAD

### Program

Thursday, September 15, 2016					
2:00pm-5:30pm	SCAD Color Matching Curriculum				
2:00pm-5:30pm	Registration Open				
6:00-7:30pm	SCAD Executive Board meeting				
7:00-9:00pm	Opening reception				

#### Friday, September 16, 2016

7:00am-4:00pm	Registration
7:00-8:00	Continental Breakfast
8:00-8:15	Opening Ceremony
8:15-9:00	Newton Fahl, Jr.: Direct–Indirect Composite Veneers – Scientific and Clinical Bases
9:05-9:35	Alessandro Devigus: Clinical Applications of a New Hybrid Ceramic Material
9:40-10:20	Q/A, Break, Poster viewing, CDT competitor viewing
10:20-10:50	Thomas Singh: Layers of Creation - The Art behind the Smile
10:55-11:25	Jack L. Ferracane: Factors Affecting the Color and Color Stability of Resin-based Dental Composites
11:30-12:00	Richard Young: <i>Photography:</i> A Must for Communication in Dentistry
12:00-1:00	Q/A, Lunch
1:00-1:30	So Ran Kwon: Tooth Whitening: A Prospective View
1:35-2:05	Sergio Rubinstein: Parameters for Integration of Aesthetics and Function in Implant Dentistry
2:10-2:40	Shigemi Nagai & John DaSilva: Color Caries Test (CCT) for Early Caries Detection - Professional Use Test and OT C In-home Use Test
2:40-3:20	Q/A, Break, Poster viewing, CDT competitor viewing

- **3:20-3:50** Giacomo Ori: Simplifying digital workflow in Prosthetic Dentistry
- **3:55-4:40** Angelo Putignano: Color in Direct Restorative Dentistry: from Art to Knowledge
- 4:40-5:00 SCAD Open Meeting
- **7:00-10:00** *President's Dinner & Award Ceremony*

#### Saturday, September 17, 2016

7:30am-4:30pm Registration Open

7:00-8:00 Continental Breakfast

- 8:00-8:45 Stephen Campbell: Making Smiles... Changing Lives...
- 8:50-9:20 Philipp Grohmann & Christopher Igiel: Encoding and Decoding of Tooth Color
- **9:25-9:55** John O. Burges: Translucent Zirconia What is this Stuff?

#### **10:00-10:40** Q/A, Break, Poster viewing, CDT competitor viewing

- **10:40-11:10** Adam J. Mieleszko: Demystifying Pink Esthetics: Role of Mini Pink Prosthetics in Anterior Restorations
- **11:15-12:00** Aki Yoshida: Mastering Shade Matching -Transfer of Color Readings and Images to Tooth Color Reproduction on all Ceramic Restorations
- 12:00-1:00 Q/A, Lunch
- **1:00-1:30** Stephen R. Snow: Digital Photography: Common Sense Concepts for Consistent Communication
- **1:35-2:05** Michael Moscovitch: Monolithic and Minimally Veneered Zirconia: A New Reality in Esthetic Outcomes of Dental Restorations
- **2:10-2:55** Marcelo Calamita: 'Do the math" The Influence of Tooth Color on Preparation Design for Porcelain Veneers from a Minimally Invasive Perspective
- 2:55-3:00 Closing Ceremony



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#### SCAD Mission and Goals

The Society for Color and Appearance in Dentistry (SCAD) was founded in 2008 as a consortium of dental professionals and other experts interested in this area of aesthetic dentistry specifically related to scientific investigation and application of color and appearance in dentistry.

The SCAD goals are as follows:

- To serve as a uniting force in the profession by promoting and fostering greater awareness for color and appearance;
- To advance multidisciplinary collaboration and discovery among industrial and institutional researchers, clinicians, laboratory technicians and others with an interest in color and appearance in dentistry;
- To create and implement educational and training programs on color and appearance for dental professionals and students;
- To promote dental health for the general public through the advanced art and science of color and appearance in dentistry.

#### SCAD Governance

#### **EXECUTIVE COMMITTEE**

President: Dan Nathanson President-Elect: Newton Fahl Vice-President: William M. Johnston Secretary: Esam Tashkandi Treasurer: John M. Powers Immediate Past President: Edward J. Swift, Jr.

#### **Board Members-at-Large**

Sabiha Bunek Shigemi Nagai Joe C. Ontiveros Aki Yoshida

#### **Executive Director**

Rade D. Paravina

#### **REGIONAL COUNCILORS**

Andrey Akulovich, Russia Luiz Narciso Baratieri, Latin America Federico Ferraris, Europe Yumiko Hosoya, Asia-Pacific Ernesto Lee, North America Esam Tashkandi, Africa & Middle East

## Poster Session and SCAD VITA Research Award

Poster Session is a very important segment of our program. The emphasis for selection of presentations was on clinical, laboratory and educational research involving color and appearance in dentistry.

SCAD VITA Award for Excellence in Research Related to Color and Appearance in Esthetic Dentistry has been established to promote young researchers. Three categories of applicants are eligible for the awards: predoctoral students, graduate students, and non-tenured junior faculty.

We invite you to submit an abstract for consideration for poster presentation at the SCAD 2017 Annual Conference (Newport Beach on October 12-14). The instructions are provided at the SCAD website (www.scadent.org).

## Dental Technician Awards

The Society for Color and Esthetics in Dentistry (SCAD) is conducting two competitions for excellence in dental technology:

- Larsen-Chu Award: Open to dental technicians who have less than 10 years in practice
- Virtuoso Award: Open to dental technicians who have 10+ years in practice Applicants must duplicate a natural tooth using any material and technique of their choice. It can be fabricated on a die or as a solid replica (root is optional).

See www.scadent.org additional information.

## New SCAD Color Matching Curriculum (CMC)

It is our pleasure to inform you about a new half-day CE program on Color Matching in Dentistry in conjunction with the SCAD 2016 Annual Conference. This state-of-the-art combined didactic/hands-on CE course is designed to enhance the clinical outcomes, and it is in compliance with our mission to create and implement educational and training programs on color and appearance for dental professionals, dental residents, and students. CMC will provide an update on new developments on this subject, revisit and introduce improvements for traditional teaching materials, and provide a hands-on section on visual and instrumental shade matching.

A total of 24 individuals who teach (or will be teaching) this topic at dental schools in US and Canada, and United States Naval Postgraduate School, registered for CMC 2016. Registered participants and other educational institutions will be offered the course materials should they wish to include it in their teaching and/or curricula.



#### Newton Fahl, Jr., DDS, MS

Dr. Newton Fahl, Jr. received his DDS degree from Londrina State University, Brazil, in 1987. In 1989 he received the Certificate in Operative Dentistry and Master of Science degree from the University of Iowa, USA.

Dr. Newton Fahl, Jr. is a member of the American Academy of Esthetic Dentistry (AAED), founding member and past-president of the Brazilian Society of Aesthetic Dentistry (BSAD), and president-elect of the Society of Color and Appearance in Dentistry (SCAD). He is a MCG-Hinman Foundation fellow. Dr. Fahl is the recipient of the American Academy of Esthetic Dentistry (AAED) 2008 President's Award for Best Teacher and the 2011American Academy of Cosmetic Dentistry Education Award.

Dr. Fahl has published extensively on direct and indirect bonding techniques. He is on editorial board of several peer-reviewed journals. Dr. Fahl lives in Curitiba, Brazil, where he maintains a private practice emphasizing esthetic dentistry. He is director of the Fahl Center in Curitiba, Brazil where he conducts hands-on courses on direct and indirect adhesive restorationsy.

#### **Oral Presentations**

Friday, September 16 8:15-9:00

#### Direct–Indirect Composite Veneers – Scientific and Clinical Bases

#### Newton Fahl, Jr., DDS, MS

#### Lecture Description

One of the benefits of composite resins is their ability to be sculpted intraorally to achieve the correct shape and color prior to light curing. The primary challenges clinicians face with direct veneering techniques include subgingival finishing and polishing, pre-visualization of esthetic outcomes, altering incorrect color results once the restoration is completed, and shorter than expected longevity. This presentation will discuss the scientific and clinical aspects of a direct-indirect approach as a viable alternative to direct bonding for enhancing overall esthetics and clinical life span.

Objectives

- How to achieve superior marginal finishing and polishing with composite veneers.
- How to optimize the form and color of single or multiple teeth with directindirect veneers.
- How to amplify the longevity of composite veneers by proper intra and extra oral curing techniquess.

#### **Oral Presentations**

Friday, September 16 9:05-9:35

#### Clinical Applications of a New Hybrid Ceramic Material

#### Alessandro Devigus, DMD

Lecture Description

For many years CAD CAM materials for dental applications where mainly based on ceramics.

Today, recently introduced high performance composites and hybrid ceramics become more popular because they claim to combine the advantages of conventional ceramics with those of composites. This presentation shows how these innovative materials can be used advantageously for various indications and how to achieve esthetic results in everyday practice.

Objectives

- Information about the new classification of CAD CAM materials and their properties.
- Clinical application of hybrid ceramics in various indications.



Alessandro Devigus, DMD

Dr. Alessandro Devigus received his degree from Zurich University, Switzerland, in 1987. Since 1990 his working in his own private practice with a focus on CAD CAM and Digital Dentistry. He is also CEREC Instructor at the Zurich Dental School.

Dr. Alessandro Devigus is an active member of the European Academy of Esthetic Dentistry (EAED), founder of the Swiss Society of Computerized Dentistry, ITI fellow and speaker.

Dr. Devigus is editor-in-chief of the International Journal of Esthetic Dentistry, author of various publications and an international lecturer.



#### Thomas Singh, MDT

#### Born 1983 in Germany.

In 2003, after completing a dental technology apprenticeship in Augsburg, Germany, Thomas worked for four years as a certified dental technician at Langerspacher& Christ dental laboratory in Bad Woerishofen, Germany. In 2008, Thomas graduated from the Master School for Dental Technology in Munich, Germany. After enjoying private lessons byThilo Vock, Willi Geller, Uli Werder, Walter Gebhard and working for two years with Joachim Maieratoral design Bodensee, Thomas went to Boston, MA, working with Kenneth Malament, DDS (Tufts University), Dan Nathanson, DMD (Boston University), Hans-Peter Weber, DMD (Harvard University) and teaching as a visiting lecturer in the postdoctoral program for prosthodontics at Tufts University School far Dental Medicine. In 2012 Thomas became a member of the prestigious oral design group.

#### **Oral Presentations**

Friday, September 16 10:20-10:50

#### Layers of Creation -The Art behind the Smile

#### **Thomas Singh, MDT**

Lecture Description

Producing esthetic and functional ceramic salutions fs all about inspiration. motivation, emotion and passion. With his unique perspective on these essential facets of ceramic art and technology, Thomas Sing begins his famous all-encompassing presentation with a single anterior case and ends with a complex full upper and lower on implants. He will talk about things dental technicians have to be aware of, things which are important and things that are worthless. His approach will be to share ceramic cases that worked out nicely and cases that didn't-in other words, real life! A lecture by a dental technician for dental technicians<sup>1</sup>

#### Objectives

Attendees will learn:

- How to handle the single anterior restoration
- A systematic approach to complex cases
- Why some cases fail and others succeed
- A rational approach to ceramic layering.

#### **Oral Presentations**

Friday, September 16 10:55-11:25

Factors Affecting the Color and Color Stability of Resin-based Dental Composites

#### Jack L. Ferracane, PhD

Lecture Description

This presentation will discuss the compositional variables that affect the color and optical properties, as well as the color stability, of resin-based dental composite restoratives, including filler particles, pigments, monomers, photoinitiator systems and the polymerization process.

Objectives

- Explain how change in translucency during curing of dental composites is affected by shade.
- Describe how color change during aging of dental composites is affected by filler and resin formulation and photoinitiator chemistry.



Jack L. Ferracane, PhD

Jack Ferracane is Professor and Chair of Restorative Dentistry, and Division Director of Biomaterials and Biomechanics at Oregon Health & Science University, Portland, Oregon. Dr. Ferracane received a B.S. in Biology from the University of Illinois, and an M.S. and Ph.D. in Biological Materials from Northwestern University. He is a founding fellow and past-President of the Academy of Dental Materials. He is a past-President of the Dental Materials Group of the International Association for Dental Research. He is the President-elect of the American Association for Dental Research. He is the recipient of the Wilmer Souder Award from the Dental Materials Group of the IADR, and the Founders Award from the Academy of Dental Materials. He is an honorary member of the American College of Dentists and the Oregon Dental Association. He serves on the editorial board of ten journals, and is Associate Editor of the Journal of Dental Research and Odontology. He has authored a textbook entitled "Materials in Dentistry. Principles and Applications." He is a co-editor of a textbook entitled "Summitt's Fundamentals of Operative Dentistry. A Contemporary Approach," now in its fourth edition. He has published and lectured extensively on dental materials, including dental composites, adhesives, amalgam, and practice-based dental research.



#### Richard Young, DDS

Dr. Richard Young received his dental training at Loma Linda University School of Dentistry in 1985. He is an Assistant Professor of General Dentistry at LLU School of Dentistry and co-directs the undergraduate dental aesthetics program, as well as lecturing in the practice management program. His interest in dental photography spans the last 31 years and he is recognized world wide for his expertise in digital photography. His innovative and practical methods have inspired countless colleagues to adopt digital photography into their clinical procedures. Dr. Young maintains a private practice with his wife, focusing on esthetic dentistry. He has many interests outside of dentistry. and spends as much time as possible with his wife and daughter enjoying activities centered in the outdoors.

#### **Oral Presentations**

Friday, September 16 11:30-12:00

#### Photography: A Must for Communication in Dentistry

#### **Richard Young, DDS**

Lecture Description This lecture will give a brief overview of the use of photography in dentistry. It will cover the new patient experience, levels of photographic gear needed, and lab communication for color and esthetics.

Objectives

- Learn why photography is so important to the "new patient experience"
- Understand the different levels of camera gear
- Learn why photography is so important for color and esthetics in lab communication.

#### **Oral Presentations**

Friday, September 16 1:00-1:30

#### **Tooth Whitening: A Prospective View**

#### So Ran Kwon, DDS, MS, PhD

Lecture Description:

Tooth whitening has been proven to be effective and safe when used under the supervision by dental health professionals. However, the mode of action has not been well established and a detailed understanding is lacking. This presentation will cover three aspects with the aim of establishing a better understanding on the mechanism underlying tooth whitening: diffusion of whitening agents into the tooth structure: their interactions with stainmolecules and tooth structure; and micro morphological changes on the surface affecting tooth color. Elucidating the mode of action will help the dental profession to develop innovative materials that will meet the esthetic needs of our modern society.

Objectives

- Understand the mechanism of tooth whitening.
- Contemplate on how whitening materials can be improved in the future.



So Ran Kwon, DDS, MS, PhD

Dr. So Ran Kwon is an Associate Professor and Program Director at the Center for Dental Research Loma Linda University School of Dentistry where she first joined as faculty in 2011. She completed her DDS degree at Yonsei University College of Dentistry Seoul, Korea in 1993, followed by a MS and PhD degree at the Department of Conservative Dentistry in 1996 and 1999, respectively. She received her master's degree in Operative Dentistry from the University of Iowa and became board certified by the American Board of Operative Dentistry in 2011.

Dr. Kwon is a member of various professional organizations including the Society for Color and Appearance in Dentistry, American Academy of Esthetic Dentistry, Academy of Operative Dentistry, American Dental Association and the International Association for Dental Research.

Dr. Kwon serves as an associate editor of Operative Dentistry, Co-editor in Chief for Cosmetic Dentistry, and section editor for the Journal of Contemporary Dentistry. She is a reviewer for the Journal of Dental Research, Journal of Esthetic and Restorative Dentistry, Journal of Dental Education, Journal of American Dental Association, Odontology and the European Journal of Dental Education. She has authored numerous publications related to esthetic dentistry and authored a textbook, "Tooth Whitening in Esthetic Dentistry" published by Quintessence. She lectures nationally and internationally on esthetic dentistry. Her research focuses on esthetic dentistry with an emphasis on material safety and effect on tooth surface morphology.



#### Sergio Rubinstein, DDS

Dr. Sergio Rubinstein received his dental degree in 1980 from the Universidad Tecnologica de Mexico. From 1980-82 completed his specialty training in Periodontal-Prosthesis at the University of Illinois at Chicago where he was an Assistant Professor until 1992. Prosthodontist in private practice since 1986 and presently as a founder of the Dental Reconstruction Center.

Member of numerous associations has lectured to major Associations such the American Association of Oral and Maxillofacial Surgeons, American Prosthodontic Society, Academy of Prosthodontics, American Academy of Periodontology, Academy of Osseointegration, American Academy of Esthetic Dentistry, Southwest Dental Conference, American Academy of Cosmetic Dentistry, Chicago Dental Society, New York Dental Meeting and currently lectures nationally and internationally. Lecturer at DentalXP, an internet lecture site. Given hands-on courses in Adhesive Dentistry and Implant Prosthodontics. Has published several articles in Adhesive Dentistry and Implant-Prosthodontics. Author of two chapters for books in Implant Prosthodontics and the Art of Treatment Planning. Inventor of a custom abutment to prosthetically correct misaligned implants..

#### **Oral Presentations**

Friday, September 35 1:35-2:05

Parameters for Integration of Aesthetics and Function in Implant Dentistry

#### Sergio Rubinstein, DDS

#### Lecture Description

Modern Implant Dentistry is more than providing a patient with a titanium fixture and restoration. When replacing a missing tooth, patients' expectations are high from an aesthetic, functional and health perspective. Success is achieved in a reverse pathway by working from an aesthetic goal towards a healthy, supportive foundation. Periodontal problems can have an adverse effect on the esthetics of the involved teeth. Several restorative options are available but success is often dependent on cross-disciplinary treatment planning and execution. While esthetically compromised cases can be extremely challenging this interdisciplinary wisdom can salvage the esthetic compromise and offer patients optimum results.

Objectives

- Visualize from the onset the aesthetics of the final prosthesis
- Cross-disciplinary diagnosis and treatment planning as an essential key for optimal results.
- The complexity of restoring a single tooth.

#### **Oral Presentations**

Friday, September 16 2:10-2:40

Color Caries Test (CCT) for Early Caries Detection- Professional Use Test and OTC In-home Use Test

#### Shigemi Nagai, DDS, PhD, MSD John DaSilva, DMD, MPH, ScM

Lecture Description

Dental caries is the most common chronic childhood disease. According to the NHANES survey (1999-2004) 42% of children 2 to 11 years old have had dental caries in their primary teeth, and 23% have an average of 1.6 teeth with untreated decay. Furthermore, 92% of adults 20 to 64 years old have had dental caries in their permanent teeth. Currently 26% of the U.S. population (53 million) live with untreated decay in their permanent teeth.

Early diagnosis is crucial for prevention; however an easy, timely, widely accessible, and patient-reported measurement tool of early stage caries is not currently available. The Color Caries Test (CCT) was invented by our team at the Harvard School of Dental Medicine (HSDM). The Color Caries Test (CCT) enables users to visualize color signals representing early stage caries. This user-friendly test has 2 versions, "professional use" and "OTC inhome use". CCT professional use requires 3 steps: Prophy + Apply solution + See. CCT in-home use requires 3 familiar steps for the patient to follow: Brush + Bite + See. All material used for the CCT test is GRAS and FCC grade.

Objectives

This lecture aims to introduce the Color Caries Test (CCT)

After the lecture, the participants should:

- Color chemistry mechanism of CCT
- Correlation between CCT color signals
   and ICDAS scores
- Reproducibility and Interpretability of CCT.



Shigemi Nagai , DDS, PhD, MSD John DaSilva , DMD, MPH, ScM

Shigemi Ishikawa-Nagai is an Associate Professor of RestorativShigemi Ishikawa-Nagai is an Associate Professor of Restorative Dentistry and Biomaterials Sciences at the Harvard School of Dental Medicine (HSDM). Dr. Nagai received her board certification in prosthodontics in Japan in 1990 and received a Master's degree MSD in Biomaterials from Boston University Goldman School of Dentistry in 1995. At HSDM, she has served as Director of Predoctoral Prosthodontics and Advanced Dentistry in the DMD program, and Director of the Clinical Research. Dr. Nagai's accomplishments in the field of color science in dentistry have led to lectures at national and international conferences, such as a keynote at the International Association of Dental Research (IADR) in 2013.

Dr. John Da Silva received his DMD from the HSDM in 1987 where he also completed specialty training in implant dentistry, prosthodontics and geriatrics. He received his MPH & ScM from the Harvard School of Public Health in 1987 and 1992 respectively. He has served as director of Advanced Graduate Education, Chair of the Department of Restorative Dentistry and Biomaterials Sciences and was appointed Vice Dean of HSDM in 2014. Dr. Da Silva is a member of the Council of Faculties. and a fellow in the Leadership Institute of ADEA. Dr. Da Silva has received numerous honors during his academic career, including becoming an honored fellow of the American Academy of Implant Dentistry, and the Distinguished Junior and Senior Faculty Awards from the HSDM. He has published numerous journal articles and lectured nationwide.



#### Giacomo Ori, DDS, MS

Dr. Ori is a Diplomate of the American Board of Prosthodontics.

He is a member of the American Academy of Fixed Prosthodontics.

He graduated with high honors from Bologna University in 1998.

He then pursued to study abroad and became a researcher in Oral Biology at Boston University School of Dental Medicine (BUSDM).

After ten months of research on salivary proteins, Dr. Ori continued on to a post-doctoral study in General Dentistry (AEGD) where he earned a Certificate of Advanced Graduate Studies and the Excellence Award in 2002.

In July 2002, Dr. Ori began a three year residency program in Prosthodontics at BUSDM.

During the three years of the course, he was recognized for his clinical presentations in Boston, New York, Philadelphia and Chicago. He was the recipient of the Baraban Award in 2005.

Dr. Ori is partner of COBE DENTAL, a multi-specialty practice in Bologna, Italy, where his practice is limited to Prosthodontics and Operative Dentistry.

He is a reviewer for Journal of Dental Traumatology.

#### **Oral Presentations**

Friday, September 16 3:20-3:50

#### Simplifying Digital Workflow in Prosthetic Dentistry

#### Giacomo Ori, DDS, MS

#### Lecture Description

CAD/CAM fabricated restorations have been used in restorative dentistry for a numbers of years already, with great improvement of our esthetic results and simplification of the treatment procedures. In most instances the digital workflow starts in the dental laboratory with the scan of a stone model obtained from a dental impression. Recently intraoral scanners are gaining popularity and the restorative dentist becomes the initiator of the digital workflow. While scanning a single prepared tooth can be an easy task, managing complex cases could be discouraging because of the multiple steps involved. The presentation will describe how to manage the information obtained with the intraoral scanner to deal with cases of different degree of complexity.

#### Objectives

- Describe the different restorations and the different materials that can be used in digital dentistry
- Explain the advantages of the intraoral scanner compared to the traditional dental impression
- Show how the use of 3D printed models simplifies the laboratory and the clinical procedure.

#### **Oral Presentations**

Friday, September 16 3:55-4:40

Color in Direct Restorative Dentistry: from Art to Knowledge

#### Angelo Putignano, MD, DDS

Lecture Description

Direct aesthetic restorations have been a challenge for a long time, overall in anterior region particularly.

People tried different techniques with different materials, with different shade guides during their career never founding a real solution. They believed that the solution was to change "guru" hoping to follow magical protocols to solve "the problem> The truth is that only knowledge can be transferred, not the perception and even luck.

Objectives

- To show a predictable color and esthetic following knowledge and the tooth anatomy.
- To present feasible and teachable techniques for anterior region
- To present feasible and teachable techniques for posterior region.



Angelo Putignano, MD, DDS

M.D. degree and D.D.S. post graduate certificate from University of Ancona-Italy

Full professor in Restorative Dentistry at School of Dentistry Polytecnique University of Marche-Ancona-Italy

Head of Operative dentistry and Endodontics department at School of Dentistry Polytecnique University of Marche-Ancona-Italy

Dean School of Dental Hygienist Polytecnique University of Marche-Ancona-Italy

Active Member Italian Society of Operative Dentistry (SIDOC)

Founding Member Italian Academy of Esthetic Dentistry (IAED)

Active Member European Academy of Esthetic Dentistry (EAED)

Founding member of "StyleItalino"

Private practice limited to Restorative Dentistry in Ancona, Italy

He is co- author of the book "Adhesive Dentistry: the Key to success" edited by Quintessence International.

Co-Author of "Indirect Conservative Restoration of Posterior teeth" (UTET 2008)

Prof. Putignano is lecturing internationally on adhesive & aesthetic restorations.



#### Stephen Campbell, DDS, MMSc

Dr. Stephen D. Campbell received his D.D.S. from the Medical College of Virginia. He completed an Advanced Program in Prosthodontics at the Harvard School of Dental Medicine and a Master of Medical Science Degree with a biomaterials focus at Harvard University in conjunction with the Massachusetts Institute of Technology.

Dr. Campbell is a Diplomate of the American Board of Prosthodontics and is active in several dental organizations. He is Past-President of the American College of Prosthodontists (ACP), American Board of Prosthodontics, Academy of Prosthodontics, American Academy of Fixed Prosthodontics (AAFP), Greater New York Academy of Prosthodontics, and the International Association of Dental Research Prosthodontics Section. He is also the recent past-Chair of the ACP Education Foundation.

Dr. Campbell has extensive clinical experience, having spent much of his time providing patient care. He has provided over 250 invited lectures nationally and internationally. Dr. Campbell is currently Professor and Head of the Department of Restorative Dentistry and serves as Director of the Implant and Innovations Center at the University of Illinois at Chicago, as well as the Director of the Center for Digital Excellence. He has been active in dental research throughout his career having been the principal investigator for several NIH grants dealing with ceramics.

#### **Oral Presentations**

Saturday, September 17 8:00-8:45

#### Making Smiles... Changing Lives...

#### Stephen Campbell, DDS, MMSc

#### Lecture Description

Prosthodontics has changed in a way that few envisioned. Changing technology and patient care trends have expanded our scope of patient therapy. Our practices and patient care alternatives have become more diverse and complex. As a result, first choice treatment alternatives and best practice therapies for our patients have dramatically changed. The presentation will consider how assessment and diagnosis guide our decision-making to maximize esthetic outcomes. The lecture will focus on the key parameters that guide our esthetic outcomes and how to realize them.

#### Objectives

- To understand the critical assessment, diagnostic, and prognostic parameters that impacts our treatment planning and therapy as part of maximizing esthetic outcomes
- To understand and apply a variety of restorative materials, techniques, and technologies with a special emphasis on ceramics.

#### **Oral Presentations**

Saturday, September 17 8:50-9:20

Encoding and Decoding of Tooth Color

#### Philipp Grohmann, DDS, CDT Christopher Igiel, DMD, MSc

Lecture Description

The communication on tooth color qppearance between dental technician and dentist is an important issue. It is highly desirable to develop a predictable and safe way to encoding and decoding the shade. Transferring the tooth color information from the office to the lab, based on the daily experience and the study from the university of Mainz, will be presented. New findings will be demonstrated on the benefits of using a spectrophotometer for the material selection.

Objectives

- How to use the the new spectrometer "Easyshade V" in daily practice
- How can an App help in the comunication between dentist and technician
- How can we use the obtained data for material and cement selection.



Philipp Grohmann, DDS, CDT

Christopher Igiel, DMD, MSc

Upon completion of his professional training in 1995, Philipp Grohmann worked in various laboratories in Germany, Canada, Mexico and Switzerland as a dental technician. Between 1996 and 1999 he attended continuing education courses in Advanced Dental Technology at the University of Zürich, under the guidance of Prof. P. Scharer.

Dr. Philipp Grohmann received his DDS degree from the University of Bern in 2007. In 2015 he was awarded a title "Specialist for Reconstructive Dentistry SSRD/SSO" after completing a postgraduated program at the university of Zurich under the guidance of Prof. Ch. Hämmerle. He won the SSRD Research Award in 2013. He is a member of the Swiss Society for Reconstrictive Dentistry.

He practices in his private office close to Zürich, Switzerland.

Dr. Christopher Igiel is Assistant Professor at the Department of Prothetic Dentistry at the Medical Center of the Johannes-Gutenberg University Mainz. Since 2015 he is in charge of the clinical dental education program in prosthodontics. In 2016 he received his Master degree from the University of Greifswald in Prothetic Dentistry. He is Member of the IADR and several national scientific organizations.



John O. Burges, DDS, MS

Dr. John O. Burgess is a 1975 graduate of Emory University School of Dentistry. He received his MS in Biomedical Sciences from the University of Texas Health Science Center in Houston, Texas; completing a one year General Practice Residency and a two year General Dentistry Residency. He served as a military consultant in general dentistry to the Air Force Surgeon General.

Currently, Dr. Burgess is Professor and Director for the Division of Biomaterials, as well as Assistant Dean for Clinical Research at The University of Alabama in Birmingham—School of Dentistry. He received certification from the American Board of Dentistry and is a diplomat of the Federal Services Board of General Dentistry, He is a member of many dental associations, including the American Academy of Restorative Dentistry, the American Dental Association, the Academy of Esthetic Dentistry, the American Association for Dental Research, the Academy of Derative Dentistry, and is a fellow of the Academy of Dental Materials.

Dr. Burgess has published more than 500 articles, abstracts and textbook chapters. He is a prolific researcher, with clinical protocols evaluating self etch and total etch adhesives, ceramic materials, self-adhesive and bulk fill composite resins, digital impression systems, vital pulp therapy agents, fluoride-releasing materials, low shrinkage posterior composites, impression materials, and bleaching agents. Dr. Burgess has presented more than 1000 continuing education courses, and lectures extensively nationally and internationally.

Dr. Burgess is married to a wonderful lady, Patricia. They make their home in Birmingham, AL.

#### **Oral Presentations**

Saturday, September 17 9:25-9:55

Translucent Zirconia -What is this Stuff?

#### John O. Burges, DDS, MS

#### Lecture Description:

This presentation will provide a brief description of currently available ceramic materials focusing largely on the newest translucent (cubic containing) zirconia materials. Why is the strength of the cubic containing zirconia less than yttria stabilized I tetragonal zirconia? Is the wear of the opposing enamel increased? Can they be bonded with the same systems used with conventional zirconia? Data will be presented to support the clinical use of this new material.

Objectives

- Discover the differences between cubic and tetragonal zirconia
- Learn which zirconia is best for different clinical applications
- Learn bonding methods for translucent zirconia restorations.

#### **Oral Presentations**

Saturday, September 17 10.40-11:10

#### Demystifying Pink Esthetics: Role of Mini Pink Prosthetics in Anterior Restorations

#### Adam J. Mieleszko, CDT

Lecture Description:

Anterior esthetics is the balance of the white and the pink proportions. Tension free and visually pleasing smile is a goal of every restorative team. The decision making process of when and how to use interdisciplinary therapy to address a failing single tooth as well as loss of attachment around teeth adjacent to the natural dentition, an implant, or an edentulous ridge can be daunting. Often an addition of mini pink prosthetics pre or post periodontal therapy is a solution to insufficient tissue volume and disproportionate tooth form. A presentation of existing pink determinants will be outlined in addition to the application of mini pink prosthetics to improve harmony of a smile.

Objectives for mini pink prosthetic fabrication

- Color selection and documentation.
- Design of the transitional prosthetic edge.



Adam J. Mieleszko, CDT

Adam J. Mieleszko, CDT graduated in 1997 from New York City Technical College with a degree in Dental Laboratory Technology. In 2000, he received certification in dental ceramics. Since then he has worked in close collaboration with a leading prosthodontists in the field. Interacting with patients on daily bases mastered his skills in dental aesthetic challenges. Adam coauthored a book "Fundamentals of Color, Shade Matching and Communication in Esthetic Dentistry" (Quintessence Publishing, 2004, 2011'2<sup>nd</sup> edition) and contributed to numerous clinical and technical articles in industry journals.



Aki Yoshida, RDT

Aki Yoshida is Master Ceramist with many years of experience in all aspects of Dental Technology. His passion and the talent that brings to the industry has been widely recognized.

Aki is owner-operator of Gnathos Dental Studio in Weston, Massachusetts USA. The laboratory , originally founded by Dr. Lloyd L. Miller, is an innovative, quality driven dental lab consistenly producing the highest level of dental restorations.

Aki graduated from the Dental Technician School of Nihon University in Tokyo Japan.

He is a technical instructor at Tufts University, Dept. of Post-Graduate Prosthodontics in Boston, where he has participated in Post Doctoral Courses for both dentist and technicians.

He is Fellow member of the AAED (American Academy of Esthetic Dentistry).

He also instructor for Kuraray Noritake Dental Supply.

Aki has presented numerous hands-on courses and lectures throughout the United States, South America, Europe and Asia. He is a fourtime masterpiece Technician in the Japanese *Quintessence of Dental Technology*, and he has published several articles on anterior esthetic restoration in the US version of QDT.

#### **Oral Presentations**

Saturday, September 17 11:15-12:00

Mastering Shade Matching -Transfer of Color Readings and Images to Tooth Color Reproduction on all Ceramic Restorations

#### Aki Yoshida, RDT

#### Lecture Description

Over the past few decades, many color measuring devices have been introduced. however there has not been a reliable device that can provide precise readings and images for clinical dentistry. Successful color reproduction of natural teeth requires advanced techniques based on color science and artistic skills. Base shade selection and value control play critical roles in obtaining excellent color match in all ceramic restorations. This process requires accurate color determination using precise color measurement and an understanding of the three dimensional characteristics of texture and translucency. A sophisticated system which can provide accurate color readings and images is highly desirable in the digital era. Recently, a total color management system employing a compact digital camera and innovative software has been developed. This system can deliver not only tooth images, but also precise color readings. In this lecture, the application of this system for color determination, communication, and reproduction will be discussed.

#### Objectives

At the conclusion of this lecture participants will have gained an understanding of:

- Accurate color determination using precise color measurement
- Transfer of color readings to tooth color reproduction
- Understanding of the three dimensional characteristics of texture and translucency.

#### **Oral Presentations**

Saturday, September 17 1:00-1:30

#### Digital Photography: Common Sense Concepts for Consistent Communication

#### Stephen R. Snow, DDS

#### Lecture Description

Although digital photography has become an essential part in the delivery of care in contemporary dental practice, clinicians are often frustrated by the inconsistency of the images they create. Objective dental diagnosis, useful shade evaluation, and effective laboratory communication are only possible with dependable photography. Intentional choices that combine prudent photographic techniques with computer procedures are required for repeatable and predictable results. This presentation will explore the integration of best practices for a strategic workflow throughout image capture, processing, and viewing to achieve color precision and accuracy.

Objectives

Course attendees will learn

- Key principles for predictable digitization of light in photography.
- How to avoid the pitfalls that destroy color accuracy in images
- Strategies to capture and process digital images for accurate and consistent results.



#### Stephen R. Snow, DDS

Stephen R. Snow, D.D.S. earned his DDS degree from the UCLA School of Dentistry. He is a Fellow of the American Academy of Esthetic Dentistry, an Accredited Member of the American Academy of Cosmetic Dentistry, and an active member of the American Academy of Restorative Dentistry. He lectures internationally on smile design, cosmetic treatment techniques, and digital technology. Dr. Snow is the founder and director of P.E.R.F.E.C.T. Perspectives Advanced Dental Seminars. He is a visiting faculty member at UCLA Center for Esthetic Dentistry and the Digital Image Institute. He maintains a fulltime private practice in Danville, CA emphasizing cosmetic restorative dentistry.



Michael Moscovitch DDS

Dr. Michael Moscovitch received his DDS. from McGill University (1976). He completed his Prosthodontic training at Boston University, Henry M. Goldman School of Dental Medicine (1978). Presently he is an Assistant Clinical Professor, Division of Restorative Sciences, at Boston University, and Clinical Instructor, McGill University Residency Program at the Jewish General Hospital in Montreal.

He is a member and Past-President of the Association of Prosthodontists of Canada.

As well he holds memberships in numerous dental organizations including:

The International College of Prosthodontists The American College of Prosthodontists The American Academy of Esthetic Dentistry The Academy of Osseointegration

The European Academy of Osseointegration Fellow of the American College of Dentists Fellow of the Greater New York Academy of Prosthodontics

Fellow and Program Chair of the Northeast Gnathological Society (New York)

The Association of Prosthodontists of Quebec He has lectured and published internationally and actively contributes to dental education. He maintains a private practice in Montreal limited to Prosthetics and Implant Dentistry.

#### **Oral Presentations**

Saturday, September 17 1:35-2:05

Monolithic and Minimally Veneered Zirconia: A New Reality in Esthetic Outcomes of Dental Restorations

#### **Michael Moscovitch, DDS**

Lecture Description

Recent developments in the esthetic properties of the high performance ceramic material (HPC) Zirconia (3YTZP), has led to the increased use of this material in place of metal and lesser strength ceramics in dental restorations. This presentation will explore the esthetic outcomes of traditional monolithic and minimally veneered high performance zirconia ceramics as well as newer monolithic translucent zirconia for use in implant and tooth supported crowns and bridges across all case categories. As well, 7+ year data exploring the clinical performance of this material will be reported. The workflow in the production of high performance ceramic restorations will be discussed with special emphasis on the utilization of provisional and prototype restorations to achieve dentist centric control of fit, function and appearance of the definitive restoration.

Objectives

- Understand of the benefits of high performance zirconia ceramics.
- Achieve insight into new treatment workflows and patient treatment outcomes.
- View clinical performance data of high performance ceramics.

#### **Oral Presentations**

Saturday, September 17 2:10-2:55

'Do the math" - The Influence of Tooth Color on Preparation Design for Porcelain Veneers from a Minimally Invasive Perspective

#### Marcelo Calamita, DDS, MS, PhD

Lecture Description

Various types of tooth preparations for porcelain veneers have been proposed, depending on factors such as the properties of the ceramic material, remaining tooth color, need for altering the tooth contour, laboratory fabrication technique, and occlusal relationships. Clinical observations of successes and failures associated with the development of techniques and materials have allowed some safe parameters to be delineated for effectively performing dental preparations for porcelain veneers or even bonding veneers without any preparation.

#### Objectives

- To describe the parameters that must be taken into consideration before the dentist take the handpiece and start this irreversible procedure
- To avoid excessive or incorrect tooth preparation by indicating the exact amount and location of the tooth reduction necessary to attain the desired color and shape.



#### Marcelo Calamita, DDS, MS, PhD

Dr. Marcelo Calamita received his DDS degree in 1988 from the University of Sao Paulo, where he also obtained his certificate, MS, PhD degrees in prosthodontics. He worked as clinical instructor in the Department of Prosthodontics of the same university for 17 years. He was associate professor of prosthodontics at University Braz Cubas and University of Guarulhos, both in Sao Paulo, Marcelo Calamita is the former president of the Brazilian Academy of Esthetic Dentistry and former editor-in-chief of the Dental Press Brazilian Journal of Esthetics. In addition, he has lectured nationally and internationally, written numerous scientific publications and chapters in textbooks on treatment planning, implants and esthetic restorative dentistry. He maintains a private practice in Sao Paulo focusing on comprehensive restorative, esthetic and prosthetic implant dentistry.

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Chair, Dr. Magda Eldiwany

#### Abstract #1

# Differences in Fluorescence of Natural Teeth and Composite Materials

#### M. Antonov<sup>1\*</sup>, D. Manojlović<sup>2</sup>, L. Lenhardt<sup>1</sup>, I. Zeković<sup>1</sup>, M. Dramićanin<sup>1</sup>

- <sup>1</sup> University of Belgrade, Vinča Institute of Nuclear Sciences, Belgrade, Serbia
- <sup>2</sup> University of Belgrade, School of Dental Medicine, Belgrade, Serbia

**Objectives:** To examine and compare fluorescence of teeth related to different groups, age, gender, smoking, consummation of different drinks, earlier tooth discoloration, dental status, systemic or local disease and compare them to commercial RBCs.

**Methods:** Fluorescence was measured on 50 teeth from patients of different gender and age, related to different smoking habits, consummation of different drinks, earlier tooth discoloration, dental status, systemic or local disease. Tooth color was measured with a spectrophotometer *VITA Easyshade Advance 4.0* and to selected teeth of similar shade (A2). Composite samples were prepared of four commercial RBCs from different manufacturers of A2 shade: *Z250 (3M ESPE), Gradia Direct (GC), Evetric (lvoclar Vivadent)* and *Herculite XRV (Kerr)* and cured with *LEDition (lvoclar Vivadent)* for 40 s. Fluorescence measurements were carried out on a *Horiba* spectrofluorimeter *Jobin Yvon FL-221* in the range of excitation of 270-550 nm and the emission range of 300-600 nm.

**Results:** The excitation–emission spectrum (*EES*) of teeth showed intense blue-green fluorescence (350-550 nm, *visible light*) when excited with light of 270-470 nm wavelengths (ultraviolet and blue light). The highest emission intensity was at about 440 nm (blue light) for all excitations, while the most intense excitation was at about 370 nm. Emission range and intensity of excitation and emission of RBCs were different for different manufacturers. Fluorescence of teeth significantly differ among different teeth groups, patients of different age, gender, earlier tooth discoloration, dental status, systemic or local disease and didn't match tested commercial RBCs.

**Conclusions:** Variables among different teeth show different fluorescent properties. Fluorescence may be undeservedly neglected hence it adversely affect the overall esthetic properties of teeth as well as any esthetic restorative material used, especially when they are exposed to light with a strong UV component.

Abstract #2

#### Evaluation of the Color Difference Caused by the Modification of Restoration Thickness, Abutment and Cement Color on Feldspathic Crowns

**M. Bayadse<sup>\*</sup>, M. Weyhrauch, K.M. Lehmann, H. Scheller, C. Igiel** University Medical Center of Johannes Gutenberg-University Mainz, Department of Prosthodontics, Rheinland-Pfalz, Germany

**Objectives:** To optimize the aesthetics of ceramic restorations, it is important to determine accurately the effects of various parameters on the final color of the restoration. However, there is a lack of information on what determines the color of feldspathic crowns formed using ceramics such as VITA Mark II. The aim of this study was to evaluate the effects of the ceramic layer thickness, cement color, and abutment tooth color on the color of the ceramic crown restoration.

**Material and Methods:** A total of 30 all-ceramic monolithic crowns (VITA Mark II; VITA Zahnfabrik) were fabricated using a CAD/ CAM system. The crowns were divided into three groups of differing ceramic thickness (i.e., 1.0, 1.5, and 2.0-mm thick). Each type of crown was seated on six different-colored abutment teeth (1M1, 1M2, 2M2, 3M2, 4M2, 5M2) using six different try-in pastes colors. The color of the resulting restoration was evaluated using spectrophotometry with a spot-measurement device (VITA Easyshade advance 4.0; VITA Zahnfabrik). Color data are expressed in CIE L\*a\*b\* system coordinates, and color difference  $\Delta$ E relative to the reference tooth were calculated and analyzed using one-way analysis of variance with the Bonferroni post hoc test at  $\alpha = 0.05$ .

**Results:** The color difference  $\Delta E$  of the feldspathic all-ceramic system was significantly affected by the thickness of the ceramic layer, the cement color, and the abutment tooth color (p < 0.05). The smallest values of  $\Delta E$  compared with the reference color were found when white opaque try-in pastes were used. As the thickness of the ceramic layer increased from 1mm to 2mm, a significant decrease in  $\Delta E$  was found. As the color of the abutment tooth varied from light to dark, we found a significant increase in  $\Delta E$ .

**Conclusions:** The thickness of the ceramic layer, the cement color, and the color of the abutment tooth significantly affected the color of the resulting CAD/CAM feldspathic ceramic crown restoration.

Abstract #3

# The Role of the Shadeguides' Tabs Shape in Color Matching

D. Dudea<sup>1\*</sup>, H. Colosi<sup>2</sup>, A. Irimie<sup>1</sup>, A. Mesaros<sup>1</sup>, C. Gasparik<sup>1</sup> <sup>1</sup> Department of Dental Propaedeutics and Esthetic Dentistry <sup>2</sup> Department of Medical Informatics and Biostatistics Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania

**Objectives:** To evaluate whether the use of different shapes of shade guide's tabs would influence the accuracy of color matching. Methods: A group of 16 experienced observers were asked to match the shade of three composite teeth (central incisor (I), canine (C) and molar (M) mounted in a typodont) with three composite shade guides (Tetric EvoCeram) having 10 tabs in form of incisor. canine and molar, respectively. CIE L\*a\*b\*color coordinates of the teeth and tabs were measured with VitaEasyshade spectrophotometer (VITA) and, based on  $\Delta E^*_{ab}$ , a score was assigned (1 for the minimum color difference, 10 for the 10<sup>th</sup> best match); the participants were asked to indicate, for each tooth and shadeguide three options of best and closest matches. The experiment was performed under standardized conditions (viewing booth -JUST LED Color Viewing Light, JUST Normlicht; illuminant D65, diffuse/45° visualization geometry). Wilcoxon signed-rank test and Friedman test were used for the statistical analysis.

**Results:** Overall, no statistical differences was found between the total scores computed for each of the targeted tooth, when matched with the three shapes of shade guides. When the "incisor shape" shade guide was used, a total score of 163 was recorded for the evaluation of the I, 215 for C, 218 for M. With the "canine shape" shade guide, the total scores were 166 for I,199 for C and 196 for M. The "molar shape" shade guide generated a score of 165 for I, 255 for C and 212 for M.

**Conclusions:** Under the limitation of this study, when C and M were matched with shade-guides with similar shapes, better matching scores have been found than with the Incisor-shape tabs, however, the results were not significantly different. The matching scores for the I were higher and the results varied less in relation with the shade guide.

Acknowledgement: This study was supported by Research Project PN-II-PT-PCCA-2011-3-2-1275.

Abstract #4

# Assessment of Bleaching Efficiency Using the New CIELAB-based Whiteness Index

C. Gasparik<sup>1\*</sup>, A. Irimie<sup>1</sup>, M. Varvara<sup>1</sup>, M. Moldovan<sup>2</sup>, D. Dudea<sup>1</sup> <sup>1</sup> Department of Prosthetic Dentistry and Dental Materials, Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca, Romania

<sup>2</sup> Department of Polymeric Composites, Raluca Ripan Chemistry Research Institute, Cluj-Napoca, Romania

**Objectives:** to assess the bleaching efficiency of one experimental and three commercial gels upon composite resin by using both color variation (expressed as  $\Delta E^*_{ab}$ ) and the recently introduced CIELAB-based whiteness index (WI<sub>D</sub>).

**Methods:** twenty-five discs were obtained from a nanocomposite resin (Filtek A2 dentin shade). The composite discs were immersed in a coffee solution for 24h and then divided in 5 groups: one control (1) and four test groups (2-5). Group 2 (natural-based extract experimental gel), 3 (WhiteWash Professional Carbamide Peroxide Teeth Whitening Gel 10%) and 4 (Opalescence PF 16%) underwent the following bleaching procedure: 5 applications, 6h/day. For group 5 (Opalescence Quick PF 45%) two applications were performed (30min/application). Color parameters were recorded at baseline (after immersion in coffee) and after each bleaching gel application; color difference ( $\Delta E^*_{ab}$ ) and WI<sub>D</sub> were calculated accordingly. Data were analyzed statistically using the repeated measure ANOVA test at  $\alpha$ =0.05 significance level and multiple comparisons were adjusted by the Bonferroni method.

**Results:** At the end of the bleaching procedures the following  $\Delta E^*_{ab}$  values were calculated related to baseline: group 1: 5.12; group 2: 6.22; group 3: 7.66; group 4: 7.68; group 5: 8.06. Based on multiple comparisons, no statistically significant difference was observed between groups 3, 4 and 5 (p>0.05). WI<sub>D</sub> ranged between 33.44 - 23.89 in group 1; 30.68 - 19.20 in group 2; 28.23 - 14.49 in group 3; 28.99 - 15.13 in group 4; 33.07 - 18.05 in group 5. Excepting group 3 and 4, a statistically significant difference was demonstrated between all groups (p<0.001).

**Conclusions:** Despite the fact that the greatest color difference was calculated for Opalescence Quick PF 45%, a better bleaching efficiency according to the  $WI_D$  was observed for White Wash 10%. The experimental gel generated the lowest bleaching effect; however, it exceeded the perceptibility and acceptability limits.

Acknowledgement: This study was supported by Research Project PN-II-PT-PCCA-2011-3-2-1275.

Abstract #5

#### Color Difference Thresholds for Esthetic Gingiva Restorations: A Pilot Study

# R.I. Ghinea<sup>1\*</sup>, M.M. Perez<sup>1</sup>, F.C. Perez<sup>1</sup>, A.M. Ionescu<sup>1</sup>, J.C. Cardona<sup>1</sup>, L.J. Herrera<sup>2</sup>, R.D. Paravina<sup>3</sup>

- <sup>1</sup> Department of Optics, Faculty of Science, University of Granada, Granada, Spain
- <sup>2</sup> Department of Computer Architecture and Computer Technology, ETSIIT, University of Granada, Granada, Spain
- <sup>3</sup> Department of Restorative Dentistry and Prosthodontics, School of Dentistry, University of Texas, Houston, TX, USA; Houston Center for Biomaterials and Biomimetics (HCBB), Houston, TX, USA

**Objectives:** The objective of the study was to determine the perceptibility and acceptability thresholds for gingiva restorations using CIEDE2000 ( $\Delta E_{00}$ ) and CIELAB ( $\Delta E_{ab}^*$ ) color difference formulas and a TSK Fuzzy Approximation. The influence of the lightness of teeth (light - L, medium-dark - M and dark - D) on the threshold value was analyzed.

**Methods:** A panel of 7 observers (4F/3M) performed independent observations of perceptibility and acceptability judgments on 180 digital images displayed on a calibrated monitor that represented combination of two different colors of healthy human gingiva ( $AE_{00}$  ranging from 0.2 to 5.0 units) and two proximal teeth - central incisors - (60 sample pairs with L, M and D incisors each) (Figure 1). Color differences between gingiva pairs were calculated using both CIEDE2000 ( $AE_{00}$ ) and CIELAB ( $AE_{ab}^*$ ) color difference formulas. A TSK Fuzzy Approximation was used as fitting procedure and the 50:50% perceptibility and acceptability thresholds were calculated.



**Figure 1.** Example of digital images used for threshold evaluation representing combination of two different colors of healthy human gingiva and two proximal teeth - central incisors - with different lightness: a) Light; b) Medium-Dark; c) Dark.

**Results:** The results obtained for the 50:50% Acceptability and perceptibility thresholds with both color difference formulas are presented in the Table below. The 50:50% Perceptibility thresholds found were  $AE_{00}=0.73$  and  $AE_{ab}*=1.24$  units. The highest perceptibility and acceptability thresholds were recorded for teeth of medium lightness (L\*), while the lowest ones were recorded for light teeth.

50:50% Thresholds	Perceptibility		Acceptability	
	AE <sub>00</sub>	AE <sub>ab</sub> *	AE <sub>00</sub>	AE <sub>ab</sub> *
All pairs	0.7	1.2	2.2	2.9
Light Teeth	0.7	1.1	2.0	2.7
Medium-Dark Teeth	0.8	1.4	2.3	3.0
Dark Teeth	0.7	1.3	2.3	3.1

**Conclusions:** There is a significant difference between perceptibility and acceptability thresholds for aesthetic gingival restorations independently of the color difference formula used. Also, differences among thresholds were registered depending on the lightness of the proximal teeth.

Abstract #6

#### Normal Color Distribution of Young Adult Gingiva

#### H.K. Hyun

Department of Pediatric Dentistry, School of Dentistry, Seoul National University, Seoul, Korea

**Objectives:** The purpose of this in vivo study was to investigate the distribution of colorimetric values in different areas of gingiva and to determine its relationship to colorimetric findings of the tooth and skin in a young Korean population.

**Methods:** Participants included 40 periodontally healthy adults (22 men and 18 women) aged 25 to 36 years. CIE *L*\* (lightness), *a*\* (green-red), and *b*\* (blue-yellow) were measured using a colorimeter at a total of 23 sites for each participant, including attached gingiva (AG) and alveolar mucosa (AM) in the maxillary and mandibular and incisor and molar regions, maxillary central incisor, and skin points of the glabella, cheek, and inner upper arm.

**Results:** AG showed higher  $L^*$  and lower  $a^*$  compared with AM. AG demonstrated higher  $L^*$  and lower  $a^*$  in the maxillary region than in the mandibular region and higher  $b^*$  in the incisor region than in the molar region. AM revealed higher  $L^*$  and lower  $a^*$  and  $b^*$  in the incisor region than in the molar region. Positive significant correlations were found for  $L^*$  between the skin area and AM and for  $b^*$  between the skin area and AG.

**Conclusions:** The colorimetric values of AG and AM differ according to the area, possibly as a result of differences in anatomic and histologic distribution that influence optical properties.

Abstract #7

# Optical Properties of Pre-colored Dental Monolithic Zirconia Ceramicsl

#### H.K. Kim<sup>1</sup>, S.H. Kim<sup>2\*</sup>, J.S. Han<sup>2</sup>, I.S. Yeo<sup>1</sup>

- <sup>1</sup> Comprehensive Treatment Center, Seoul National University Dental Hospital, Seoul, Republic of Korea
- <sup>2</sup> Department of Prosthodontics and Dental Research Institute, School of Dentistry, Seoul National University, Seoul, Republic of Korea

**Objectives:** The purposes of this study were to evaluate the optical properties of recently marketed pre-colored monolithic zirconia ceramics and to compare with those of veneered zirconia and lithium disilicate glass ceramics.

Material and Methods: Various shades of pre-colored monolithic zirconia, veneered zirconia, and lithium disilicate glass ceramic specimens were tested (17.0  $\times$  17.0  $\times$  1.5 mm, n=5). CIELab color coordinates were obtained against white, black, and grey backgrounds with a spectrophotometer. The translucency parameter (TP) was calculated. Color differences of the specimen pairs were calculated by using CIELab ( $\Delta E^*_{ab}$ ) and CIEDE2000 ( $\Delta E_{ab}$ ) formulas. X-ray diffraction was used to determine the crystalline phases of monolithic zirconia specimens. Data were analyzed with one-way ANOVA. Scheffé post hoc, and Pearson correlation testing ( $\alpha$ =.05). **Results:** For different shades of the same ceramic brand, there were significant differences in  $L^*$ ,  $a^*$ ,  $b^*$ , and TP values in most ceramic brands. With the same nominal shade (A2), statistically significant differences were observed in  $L^*$ ,  $a^*$ ,  $b^*$ , and TP values among different ceramic brands and systems (P<.001). The color differences between pre-colored monolithic zirconia and veneered zirconia or lithium disilicate glass ceramics ranged beyond the acceptability threshold.

**Conclusion:** Due to the high *L*\* values and low *a*\* and *b*\* values, precolored monolithic zirconia ceramics can be used with additional staining to match neighboring restorations or natural teeth.

#### Abstract #8

# Ultrastructural Study of Enamel Surface after Dental Bleaching

#### M. Moldovan<sup>1\*</sup>, S. Cuc<sup>1</sup>, D. Prodan<sup>1</sup>, C. Sarosi<sup>1</sup>, G. F. Moldoveanu<sup>2</sup>

<sup>1</sup> Babes Bolyai" University, "Raluca Ripan" Chemistry Research Institute, Department of Polymer Composites, Cluj-Napoca, Romania <sup>2</sup> "Carol Davila" University of Medicine and Pharmacy.

Faculty of Dentistry, Bucharest, Romania

**Objective:** This study evaluated the morphological effects produced *in vitro* by two bleaching agents (*experimental natural bleaching gel G28*<sup>®</sup> and commercial bleaching gel Opalescence<sup>®</sup> *PF 16%* (*Ultradent*)) on enamel surface using scanning electron microscopy (SEM), and atomic force microscopy (AFM) analysis.

**Materials and Methods:** A total of 30 human teeth were collected (n=10), which were divided into 3 groups (1 blank, 2 - experimental gel *G28*°; 3 - gel Opalescence° PF 16%). The protocol was carried out for 14 days, with one application of whitening material 5 hours for each day of every bleaching agent. After each stage the teeth were washed under running water for 60 seconds and then kept in artificial saliva. Two methodologies were used: AFM (NTEGRA Spectra (NT-MDT)), to observe surface roughness (Ra) and SEM (Inspect F-FEI), to observe the enamel surface effects.

**Results:** On comparing the AFM images of untreated and treated enamel, surface alterations were observed after 30 h of treatment with *Opalescence*<sup>®</sup> PF 16%. The registered results following the test regarding Ra (Sa) the arithmetical average roughness indicate values between 40-256 nm. The results of ANOVA test for enamel roughness before and after whitening, reveals that between the average values of those two whitening materials tested on the two groups 2 and 3, there are statistically significant differences (p<0.05). The comparison of treated and untreated enamel by SEM analysis, revealed that the treated surface had increased surface change and porosity after the equivalent of 30 hours of exposure to the bleaching gel G28<sup>®</sup> no changes were observed on enamel surface.

**Conclusions:** The surface morphology of initial samples, before whitening, offers an important reference point for the correct and accurate assessment of effects induced by these treatments.

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#### Abstract #9

#### Whitening-Dependent Changes of Fluorescence of Extracted Human Teeth A Pilot Study

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**Objectives:** To evaluate fluorescence properties of extracted human teeth whitened with 40% hydrogen peroxide in vitro. Methods: A total of 28 extracted human teeth (14 anterior. 14 posterior) stored in Sodium Azide Solution (0.9% saline, 0.25% NaN3) were used. Teeth were pumiced for one minute using a lowspeed dental handpiece and a disposable rubber cup. Baseline fluorescence measurements (T0): Maximum Excitation (Ex<sub>Max</sub>, nm), Maximum Emission (Em<sub>Max</sub>, nm) and Maximum Intensity (I<sub>Max</sub>10<sup>8</sup>, ct/s), were carried out using a steady state spectrofluorometer QuantaMaster400, Horiba Scientific, Edison, NJ). The teeth were positioned in the solid sample holder allowing the excitation monochromatic beam to reach the center of the specimen. After baseline measurements, the teeth were whitened using the inoffice method with 40% hydrogen peroxide (Opalescence Boost, Ultradent Products, South Jordan, UT), following manufacturer's instructions (3  $\times$  20 min). The fluorescence parameters were measured under the same conditions 7 days after bleaching (T1). Means and standard deviations were calculated. Paired t-test for Equality of Means was used for comparisons of fluorescence parameters before and after tooth whitening. **Results:** The results are provided in table below.

Perceptibility Acceptability Parameters Ex<sub>Max</sub> Em<sub>Max</sub>  $I_{Max}10^8$ Ex<sub>Max</sub> Em<sub>Max</sub>  $I_{Max}10^8$ Mean (s.d.) 376 (10) 481 (5) 1.1 (0.3) 371 (10) 477 (6) 1.2 (0.2) Range 30 21 14 35 17 10 (360-390) (471-492) (0.4-1.8) (354-389) (469-486) (0.7 - 1.7)

 $Ex_{Max}$  exhibited broader range after tooth whitening. The  $Em_{Max}$  displayed a narrower range after tooth whitening and  $I_{Max}10^8$  increased at a range of 0.95 ct/s after tooth whitening. Results showed statistically significant differences among all three pairs of compared parameters before and after tooth whitening (P<0.001). **Conclusions:** Whitening-dependent shift of peaks of maximum excitation and maximum emission towards lower wavelengths (towards the blue region of the spectra) was statistically significant. The same was true for the increase of maximum intensity.

#### Abstract #10

# Color Change of Some Experimental Nanocomposites after Accelerated Aging Test

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**Objective:** To evaluate the color changes of graphene experimental dental nanocomposites after an artificial accelerated aging for 103 days, and then measured before and after immersion in two staining solutions for 30 days.

Materials and Methods: Five experimental nanocomposites, four with graphene oxide with SiO<sub>2</sub> (GS1, GS2), respectively ZrO<sub>2</sub> (GZ1, GZ2) filler nanoparticles in different percent and one without graphene (N1) were used in this study. Ten specimens of each nanocomposite material (1x15mm) were prepared by filling in a teflon mould an cured for 180 s with Wodpecker LED lamp. The specimens were artificial aging by immersion in artifficial saliva at 37°C in a water bath for 103 days. To evaluate the color stability in two different beverages, the specimens were subdivided into 2 subgroups of 5 specimens for every nanocomposites, which were immersed in red wine and coffee for 1 h a day for 30 days. To assess the role played by the color of the background the specimens were measured on black and white background. Color coordinates (L\*a\*b\*,  $\Delta$ L\*,  $\Delta$ a\*,  $\Delta$ b\* and  $\Delta$ E\*) were measured using a VİTA Easyshade Compact (VİTA Zahnfabrik) before and after 30 day of storage in coffee and red wine. Data were analyzed using Univariate Anova test (p < 0.05).

**Results:** The color difference ( $\Delta E^*$ ) of the experimental nanocomposites ranged between 2.17 and 5.98 after 30 day of immersion in the staining solutions. A significant statistical difference was found between the groups (p<0.05) and multiple comparisons showed a significant difference between black and white backgrounds (p<0.05). Low periods of immersion, like 30 days, are sufficient to produce staining and color changes to nanocomposite.

**Conclusions:** The findings of the study suggest that the type of restorative nanomaterial and staining solutions significantly influence the color stability of the materials.

Acknowledgments: This work was funded by National projects 230/2014 and 191/2014.

Abstract #11

# Color Difference Enhancement for Shade Matching with the Illuminance of Specific Color Rendering Index

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**Objectives:** The light source is a key factor to influence the observed color difference. In general, for shade matching in dentistry, the standard illuminant has been suggested to feature a correlated color temperature (CCT) of 6500K and a color rendering index (CRI) more than 90. However, CRI is just an average of 8 general Ri values from R1 to R8, while the special Ri values from R9 to R14 are neglected. Therefore, the purpose of this study was to estimate which Ri values are most important in shade matching and to further develop a better light source for dental clinic.

**Methods:** First, the reflective spectrums of two shade guide systems, including VITA Classical (A1~D4) and VITA Linearguide 3D-MASTER(1M1~5M3), were measured by a radiocolorimeter. Totally there were 42 shade tabs tested. Then we calculated the correlation coefficients (CCRS) between the reflective spectrum of R1 to R14 test color samples and each shade tab. Accordingly, for each of 14 Ri test samples, the maximum differences in CCRS among shade tabs were obtained.

**Results:** The maximum differences in CCRS among shade tabs for 14 Ri test color samples were: R1-0.47, R2-0.15, R3-0.12, R4-0.54, R5-0.52, R6-0.27, R7-0.41, R8-0.44, R9-0.52, R10-0.20, R11-0.29, R12-0.11, R13-0.22, R14-0.21.

**Conclusions:** For R4, R5 and R9, the maximum difference in CCRS among 42 shade tabs of two shade guide systems were more than 0.5. It suggests that, with similar CRI value, the higher the values of R4, R5, R9 in an illuminant, the easier the tooth shade may be distinguished during shade matching.

#### Abstract #12

# Using the Vita Easyshade V for Reproducing the Color of Single Ceramic Restorations: an in Vivo Study

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**Objectives:** The perfect smile is one of the most important aspects in patient's contentment. Therefore tooth-color is a very decisive factor for dental esthetics. The aim of this study was to evaluate, how patients and dentists assessed the color of new fixed partial dentures using the new Vita Easyshade V for the selection of the tooth shade.

**Methods:** Twenty Patients were asked to evaluate the tooth color of their new ceramic restorations after the insertion using an visual analog scala 1-10. Hereby 10 means a perfect and 1 a poor color matching. Before, the color of the new fixed partial dentures was determined using the restoration mode of the Vita Easyshade V. Dentists were asked to evaluate the final color. Additionally, tooth color of the new fixed partial dentures was verified using the Vita Easysade V. **Results:** 

Table 1. Rating of patient and dentist.						
Fixed partial dentures	Patient	Dentist	Easyshade ∆E			
1	10	10	1.0			
2	10	9	2.6			
3	10	10	2.3			
4	10	10	2.4			
5	10	9	2.7			
6	10	9	2.0			
7	10	9	2.9			
8	10	9	1.7			
9	7	5	4.6			
10	10	9	1.2			
11	10	9	1.6			
12	9	8	3.1			
13	8	7	4.1			
14	10	10	0.9			
15	10	8	2.8			
16	10	10	1.0			
17	9	9	1.6			
18	10	9	1.0			
19	10	10	2.1			
20	10	8	2.8			
	9.65	8.85	2.2			

**Conclusion:** In conclusion, there is a very high acceptance of patient rating of color of the new fixed partial dentures. Also dentists showed a high score in satisfaction of color matching.

The  $\Delta E$  values reduced to an average of 2.22 within 50:50% acceptability  $\Delta E$ =3.5 and near by 50:50 % perceptibility  $\Delta E$ =1.8 of Ghinea et al.

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