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International Ozone Association/Editorial Office  
9731 Pebble View Drive  
Cincinnati, Ohio 45252-2167  
Tel./ Fax: (1) 513.482 0429  
Email: blloeb@fuse.net

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The International Ozone Association is a nonprofit educational and scientific organization dedicated to the collection and dissemination of information on, and to promote research in, any and all aspects of ozone and related oxygen species technologies. Membership is open to any individual, corporation, or organization having interest in the latest developments and advancements in ozone technology.

As a member of the IOA, you will receive bimonthly issues of the Ozone News newsletter, bimonthly issues of the technical journal Ozone: Science & Engineering (OS&E), and IOA's Publication Catalog which includes worldwide conference proceedings, monographs, and special reprints. In addition, members receive discounts on IOA worldwide publications and meetings.

Website: [www.io3a.org](http://www.io3a.org)

For membership and publication information, please contact the IOA office nearest you:

**Pan American Group (PAG)**

Mrs. Jennifer Fuel, Administration and Communications Officer  
International Ozone Association, Pan American Group  
c/o Southern Nevada Water Authority  
PO Box 97075  
Las Vegas, NV 89193  
Tel: (1) 480-529-3787  
Fax: (1) 480-533-3080  
Email: [info3zone@ioa-pag.org](mailto:info3zone@ioa-pag.org); [jfuel@ioa-pag.org](mailto:jfuel@ioa-pag.org)

**European-African-Asian-Australasian Group (EA<sub>3</sub>G)**

Mr. Alain Lasalmonie, Secretary/Treasurer  
Association Internationale de l'Ozone  
Email : [alain.lasalmonie@gmail.com](mailto:alain.lasalmonie@gmail.com)  
Ms. Beatrice Bernard, Secretariat  
IOA-EA<sub>3</sub>G Secretariat  
7 rue Marcel Doré - Bât. B16  
86000 Poitiers France  
Tel: 33 (0) 5 49 45 44 54  
Fax: 33 (0) 5 49 45 40 60  
Email: [ioa@esip.univ-poitiers.fr](mailto:ioa@esip.univ-poitiers.fr); Web: [www.ioa-ea3g.org](http://www.ioa-ea3g.org)

**Nippon Islands Group (NIG)**

Mr. Tetsuya Tamura  
Japan Ozone Association  
Intelligent Flats 301, 10-10 Nihonbashi Tomizawa-cho  
Chuo-ku, Tokyo 103-0006, Japan  
Tel: (81) 3 6661 1622  
Fax: (81) 3 6661 1623  
Email: [tamura-joa@kmj.biglobe.ne.jp](mailto:tamura-joa@kmj.biglobe.ne.jp) web: [www.j-ozone.org](http://www.j-ozone.org)

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## PRESIDENT'S MESSAGE



### Farewell words

At the end of 2019, the time will come for my tenure as president of the IOA to end. My successor will be Dr. Saad Jasim. Saad is committed to Ozone and lives for Ozone. Each conversation with him leads to Ozone eventually. There are countless reports about his successful work for Ozone, and the number of lectures he has given is even higher.

### Looking back

I trust that readers would allow me a short review of my period in office. Essentially, two topics were dealt with and completed so that we could put it to vote at the Directors' meeting at the IOA World Congress in Nice/Southern France. The first issue is the revision of the bylaws and rules. To achieve this, it was necessary to hold the Bylaw Committee's skype conferences almost every month. Such conferences required concentration and precision. It is also to the Bylaw Committee members' merit that we completed this revision and were able to put it to vote. I would like to express my sincere thanks for this.

The second issue completed and put to vote by us is Ozone's tax status. At the start, the IOA international headquarters in the USA was allocated to tax status 501(c)3. A few years ago, this status was lost, with the IOA International being reallocated to tax status 501(c)6. Whether certain measures should be taken

or not in order to get the 501(c)3 status back - such discussions have been brought up within the Board of Directors for years and, finally, should be ended. The Board of Directors should say either "yes" or "no". Mike Oneby, in particular, gave us a lot of support in this regard.

The IOA was quite busy with the two aforementioned topics. Now I hope that these administrative issues can be considered completed, and the organization can turn toward other topics in the future.

I also started with a project but, regrettably, could not develop it as much as I hoped and wanted: by this, I am referring to a closer partnership between the Chinese Ozone Association (COA) and the IOA. Yes, I am aware that I am repeating myself, but I must write it again anyway: Without a Chinese regional group, the IOA cannot be regarded as a real international organization in the long term. There is a lack of exchange with Chinese scientists and engineers. I became aware that a Chinese regional group had come into being only after some time had already passed. A meeting with Prof. Linsheng Wei, the COA President, at the end of 2018 was very positive. Then – for a multitude of reasons – the COA Board decided to tackle this partnership, however more slowly than it was originally planned. Even at the IOA, not everybody was so keen on this, for various reasons. But there is no other way than to be frank with each other and stay open to the above-mentioned approach. How this all will progress is no longer in my hands. I would very much hope that this collaboration will be promoted further. Since the number of members at the IOA is gradually decreasing, this partnership with the COA would be very useful. Moreover, it would gain a lot from the exchange of results gained from working in the ozone field. At this point, I would like to cordially thank Prof. Linsheng Wei for his open cooperation and exchange of ideas.

### Findings

During my term of office, I discovered and learned about a lot of things. For example, that communication between the different regional groups is very limited. And that is a pity. We could learn so much from each other.

Furthermore, I got to know that the readiness for changes and for adaptation to the changing environment is very different for each of the various regional groups. If the IOA wants to keep its significance and importance, it must undergo more rapid change.

Each regional group has its own website. In my opinion, this is unnecessary: both as it is too expensive and incongruous. Any industrial group of companies has a single website, a common corporate appearance, and then – if need be – sub-areas for

## President's Message (cont'd)

individual geographical regions or member companies. Worldwide groups of companies have this structure of their websites. At the IOA, the IOA International does not have its own active home page; only its regional groups have ones. Merging all of these websites to a single one, would save money and make the web appearance more structured and easy-to-read. The question is: why do the regional groups not manage to overcome their differences?

To achieve faster changes, you need the full commitment of all operatives. But this is often not possible or only partly possible as the persons working for the organisation on a voluntary basis and for free have to manage their own professional challenges with their day jobs. So why not create a part-time job, e.g. a business director, at the IOA international level? Well, I know that it will incur a cost, but why not hire someone who could take care of special projects over a certain period of time?

Moreover, I came to the conclusion that the two-year period of office of the president and the officer is too short. Not because I would like to stay in office for a longer time, but because in such a short time you can just start something but not develop it significantly. In my opinion, the minimum should be changed to three years. Perhaps, when you make statute revisions in the future, it will be good to re-think this issue.

### Conclusion

My thoughts are certainly not given with the intent to make friends. Nor would I say that such thoughts are the only correct ones. But what I keep in mind for time and again are people who are concerned about the continued development of the IOA International and who have their own ideas and visions in this respect. To tackle such ideas and visions is, in turn, quite a different matter. This will require certain resources. But if you have neither ideas nor visions you cannot promote either.

To be a president of the IOA International was a great honour for me. On parting, I would like to cordially thank everybody who supported me in any way.

I hereby ask the regional groups to communicate more intensively and to find the way to a common and uniform IOA website, even if it would require certain compromises

I wish the IOA a long future and to remain an important and influential organization even though I'm aware that it will not be easy.

I wish my successor, Dr. Saad Jasim, great success and hope this position will bring him much satisfaction.

Bernhard Paolini  
President of the IOA, 2018-2019

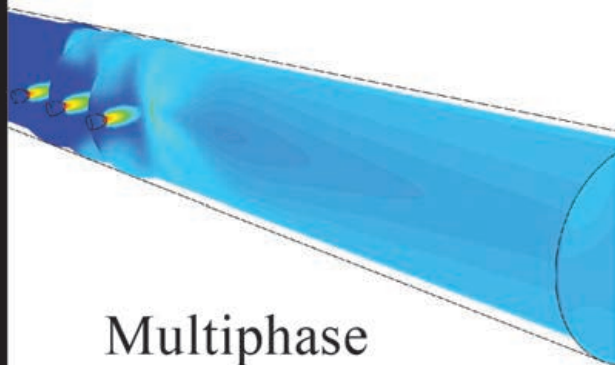
## INDUSTRY NEWS

### DR. SAAD JASIM BECOMES FIRST CANADIAN TO LEAD THE INTERNATIONAL OZONE ASSOCIATION

At the 24th World Congress & Exhibition of the International Ozone Association which was held in Nice, France October 20-25, Dr. Saad Jasim, P.Eng., was inaugurated as the President of the International Ozone Association, that marked the commencement of the First Canadian to lead the association which was established in 1973. Dr. Jasim's term starts on January 2020-January 2022. Representatives from 32 countries attended the 24th World Congress.

The inauguration took place on October 21, 2019 during the Annual General Meeting. Mr. Bernhard Paolini, Switzerland, President of the International Ozone Association, introduced Dr. Jasim, who was elected by the 3 Regional Boards of Directors (PAG, EA3G & NIG). The Canadian National Anthem in both languages, English and French was played. Dr. Jasim thanked the Boards of Directors and the members of the association for the confidence placed on him. The International Ozone Association (IOA) was formed in 1973, a nonprofit educational and scientific organization dedicated to the

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## INDUSTRY NEWS

collection and dissemination of information on, and promotion of research in, any and all aspects of ozone and related oxygen species technologies. The International Ozone Association consists of 3 regional groups, the Pan American Group (PAG) that serves all of North, Central, and South America, the Nippon Islands Group (NIG) that serves all of Japan, and the European African Australasian Group (EA3G) that serves the rest of the world.

He served as President of the International Ozone Association-Pan American Group (IOA-PAG) 2010-2011. In 2010, Dr. Jasim served as President of the Ontario Water Works Association (OWWA)-Section of AWWA.

Dr. Jasim introduced Ozone for the drinking water treatment to the City of Windsor in 2001 when he was serving as Director, Water Quality for the Windsor Utilities Commission, Windsor, Ontario, Canada. He designed complete recycled water treatment system with ozone to Green House operation in Leamington, Ontario, Canada, to reuse 100,000 liter a day and to reduce the impact of nutrients discharged to Lake Erie. He successfully introduced in 2019 the application of ozone as part of the treatment processes for Arsenic and Manganese



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## Industry News (cont'd)

treatment in the City of White Rock, BC, Canada.

Dr. Jasim introduced ozone for the treatment of Cyanotoxins from Harmful Algal Blooms, and water reuse during his tenure as Acting Research Director and Principal Investigator at the Qatar Environment and Energy Research Institute (QEERI), Hamad Bin Kalifa University, Doha, Qatar.

Dr. Jasim is a member of Editorial Boards of; Ozone Science & Engineering Journal-Taylor and Francis, and the Journal of Water Process Engineering- Elsevier.

He has received many prestigious awards such as; the 2016 George Warren Fuller Award-OWWA/AWWA, the 2011 Harvey Rosen Award-International Ozone Association, 2008 Emerald Award-Ontario Ministry of Environment, 2004 Engineer of the Year Award-Professional Engineers Ontario. Dr. Jasim serves as Adjunct Professor at the University of Windsor, Windsor, Ontario, Canada since 1996.

### MIDDLESEX WATER COMPANY INSTALLS OZONE

Middlesex Water Company, a producer of water and



wastewater and related services primarily in New Jersey and Delaware, announced that it has begun construction of a new ozone treatment facility and various other upgrades at its Carl J. Olsen Treatment Plant in Edison, New Jersey. Jacobs Engineering is the Consulting Engineer for this project.

Middlesex Water is investing \$70 million on various upgrades at the Company's existing water treatment plant to provide increased reliability and to replace sodium hypochlorite with ozone as the primary disinfectant in the water treatment process. This will help ensure compliance with increasingly stringent drinking water quality regulations and to mitigate the occurrence of disinfection byproducts formed when chlorine is used. An added benefit will be improved taste and odor of the water and addressing new chemicals of emerging concern.



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## IOA NEWS

## IOA PRESIDENT RECEIVES SILVER MEDAL



Bernhard Paolini is second from left in the photo.

IOA President Bernhard Paolini participated in a Metallic Silhouette Shooting Championship in Châteauroux, France July 31 to August 10, 2019 and received a Silver Medal.

The event was the AETSM European Championship (Association Européenne de Tir sur Silhouettes Métalliques) of which he is an active board member. Bernhard participated in the event called "Big Bore Standing" where contestants must hit the silhouettes made of steel of 10 chickens at 50m, 10 hogs at 100m, 10 turkeys at 150m and 10 rams at 200m. A perfect score is 40 hits with the world record being 34 hits. Bernhard scored 30 hits.

For aiming, only iron sights are allowed; no scopes or laser sights are permitted. The ram at 200m has a weight of 25 kg and must fall, so the chosen caliber must deliver the power to accomplish this.

Congratulations, Bernhard, on your accomplishment!



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## IOA NEWS (CONT'D)

## IOA International Board Meeting

The second 2019 meeting of the International Board of Directors of the IOA was held on Sunday October 20, 2019 at the Hyatt Regency Palais des la Mediterranée in Nice, France. Following is a summary of the meeting. As there was also a Board meeting in Atlanta on August 26, 2019, this report will focus on new information provided.

A quorum was achieved with 96% of the directors attending or sending in their proxy. The minutes of the Atlanta Board meeting had been previously received by members and were unanimously approved.

## Regional Group Reports

EA<sub>3</sub>G Report (Frédéric Violleau)

Sylvie Baig has been elected President for 2021-2021. A board member was added from the South Africa Ozone Association.



Membership remains steady at 171 with 80% from Europe, 16% Asia and 4% Australia.

A memorandum of understanding has been executed with the China Ozone Association (COA). Additional discussions are necessary with the COA to determine the role of IOA.

EA<sub>3</sub>G continues to work with Taylor & Francis on completing

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## IOA NEWS (CONT'D)

three publications:

- Medical Applications – R. Viebahn
- Wastewater Applications – M. Roustan, S. Baig
- Conference proceedings

There were several candidates for the Willy Masschelein Prize for the best ozone research thesis by a university student and the winning thesis was:

Dr. João Gomes, University of Coimbra, France for his work *“Environmentally Friendly Removal of Water Emerging Contaminants by Photocatalytic Ozonation and Biofiltration”*

An event *“IOA Technical Days 2020”* is being considered for Toulouse and being managed by the Young Ozone People.

#### NIG Report (Fumitake Nishimura)

NIG membership has increased somewhat to 100. 2018 showed a positive balance of 2,912K ¥. This is a major improvement over 2017.

The JOA (Japan Ozone Association) Annual conference in Tokyo in June 2019 drew 120 attendees and was quite successful (see report in Ozone News No 1 - 2020). Prior to that the 36th Annual Seminal on ozone technologies was held December 10-11, 2018 in Tokyo with 45 attendees.

Four JOA Ozone Manger Safety Sessions were conducted in 2018-2019.

Several JOA awards were given in 2018-2019. . OZONEWS in JAPAN continues to publish quarterly.

The JOA remains active in standardization activity. The ISO TC282 SC3 standard, *“Risk and performance evaluation of water reuse systems”*, is nearly complete. A final draft has been prepared for review and approval.

A revised Japanese Industrial Standard JIS B 9946:2011

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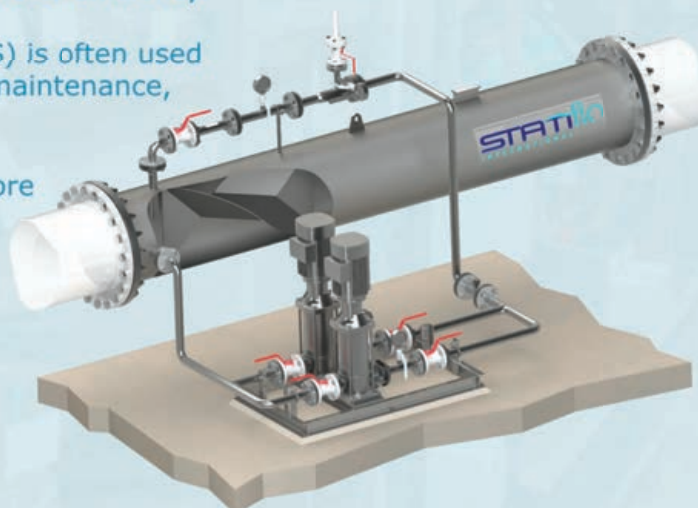
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### IOA NEWS (CONT'D)

*"Ozone treatment apparatus for waste and water in industry and other oxidation uses – Specifications of apparatus and measurement methods for ozone concentration"* has been developed. The revised standard JIS B 9946:2019 was issued on August 20, 2019.

#### PAG Report (Eric Wert)

Ben Kuhnel has been elected PAG President for 2020-2021.

The finances of PAG are solid with an operating balance of \$110k and reserve of \$60k. The organization is now able to cover its expenses with annual operating expense of nominally \$85k and annual conference surplus of \$25k to \$70k.

Membership has stabilized and the group now has 291 members. A part-time position has been added (Juan Garcia-Hernandez) to provide better customer service and marketing support.

A new membership structure was presented and approved to encourage membership by students and members that reside in Mexico and Central and South America. Also, a new sponsorship framework was implemented to give more benefits to IOA-PAG sponsors. The goal is to provide additional revenue that will fund a part time staff position that will improve member services, develop marketing materials and manage the PAG website.

Dr. Daniel Smith was nominated as Honorary Member of IOA.

The Municipal Committee is developing a training platform and has completed a course on Ozone/Oxygen Safety.

A Linked-in profile has been created and this appears to be getting better exposure than on the website.

Upcoming conferences include Las Vegas (August 17-20, 2020); IOA World Congress 2021, Windsor, Ontario, Canada (August 30- September 2, 2021)

#### Committee Reports

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## IOA NEWS (CONT'D)

### Bylaws Committee (Bernhard Paolini)

The Bylaws committee has been working diligently over the past two years to revise the bylaws and rules of the IOA to better reflect how we are currently operating. The revised bylaws and rules were sent to all Board members prior to the meeting. The revisions were approved by the Board unanimously. Bernhard Paolini thanked the committee for their efforts.

### Finance Committee (Sylvie Baig)

A proposal for the IOA to attempt to regain IRS 501(c)(3) status was reviewed. The IOA currently has 501 (c)(6) status. Achieving the 501(c)(3) status will be difficult as the IOA has no members. All members belong to the regional groups. Also, the IOA would not achieve any tax savings from the change. The Board agreed not to pursue the change.

The IOA operating budget for 2020 was reviewed. It was very similar to the 2019 budget. The organization is operating very close to the 2019 budget. A budget with income and expenses of \$148,575 was approved by the Board.

### Publications Committee (Angelo Mazzei, Barry Loeb)

#### OS&E

Issue 6 OS&E has been completed. Production of OS&E is now being handled by Integra, a supplier of publishing services with a long professional relationship with Taylor & Francis. We now have a healthy inventory of manuscripts waiting for publishing.

The contract with Taylor & Francis has been in place since 2015 and continues until 2022. OS&E remains a profitable journal for Taylor & Francis. The Impact Factor of OS&E has increased from 0.806 to 1.253 since 2015.

The Harvey Rosen Award nomination process is complete, and the winning paper is:

*"Design Considerations for Cost-Effective Ozone Mass*

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*Transfer in Sidestream Systems*” by Kerwin L. Rakness (deceased), Glenn Hunter, Julia Lew, Bill Mundy and Eric C. Wert.

A 40-year author and keyword index were developed and placed on the respective IOA websites. Due to the length of this document it was decided not to include in an OS&E issue.

### ***Ozone News***

Issue 5 has been printed and shipped. 2019 Advertising revenues are \$58,000, a decrease of about \$8,000 from 2018.

A new feature, “*Tony’s Column*” has been introduced, authored by Tony Sacco of Spartan Technologies. This column features case studies of small-medium industrial applications and has been well received.

A revised Publications Catalog was issued in June 2018. The next issue will occur later in the year.

### **Strategic Planning (Sylvie Baig)**

Discussions continue with the China Ozone Association to determine the best way that IOA can interact with them. Attempts are being made to bring a member of the South Africa Ozone Association into the EA<sub>3</sub>G Board. A map of ozone associations worldwide is being developed.

With the move of Prof. Kang to Ethiopia, an attempt is being made to find a new EA<sub>3</sub>G Board member from Korea.

A conversation has been initiated with the International Desalination Association (IDA) to see if there is any common ground.

The Wednesday workshop at the World Congress focused on innovation.

### **Elections/Awards**

The board ratified the new IOA officers for 2021 and the proposed list of directors to be ratified by the IOA General Assembly.

Sylvie Baig was awarded the Morton Klein Award of Excellence and Daniel Smith was given honorary membership.

## **IOA General Assembly Confirms New Officers, Elects Board Members**



On October 21, 2019 during the Opening of the 24th IOA World Congress and Exposition in Nice, France a General Assembly of the Association was held, conducted by IOA President Bernhard Paolini. The purpose of the General Assembly is to review the mission of the IOA and its Directors, elect new Directors for a two-year term and confirm the officers and Executive Committee for the period 2020-2021. The General Assembly was opened by IOA President Bernhard Paolini who reviewed the responsibilities of directors.

### **IOA Directors for 2020-2021**

#### ***EA<sub>3</sub>G Group***

Sylvie Baig, France  
Eric Chauveheid, France  
Cristian Carboni, Italy  
Santiago Esplugas, Spain  
Florencio Martin, France  
Christophe Mechouk, Switzerland  
Bernhard Paolini, Switzerland  
Achim Ried, Germany  
Michel Roustan, France  
Renate Viebahn, Germany  
Frédéric Violleau, France

#### ***Nippon Islands Group***

Yasumoto Magara  
Fumitake Nishimura  
Tetsuya (Ted) Tamura

#### ***Pan American Group***



Nick Burns  
 Saad Jasim  
 Bob Kim  
 Jim Klein  
 Ben Kuhnel  
 Jim Lauria  
 Angelo Mazzei  
 Bill Nezgod  
 Chris Schulz  
 Dan Smith  
 Eric Wert

Also, IOA Past Presidents are included in the list of directors and have voting rights when they attend Board meetings.

#### IOA Executive Committee for 2020-2021

President	Said Jasim
President-elect	To be appointed shortly (EA <sub>3</sub> G)
Immediate Past President	Bernhard Paolini
Treasurer	Sylvie Baig
Secretary	Nick Burns
EA <sub>3</sub> G President	Sylvie Baig
NIG Chair	Yasumoto Magara
PAG Chair	Ben Kuhnel
Editor in Chief	Barry Loeb
Chair Publication Comm.	Angelo Mazzei

IOA President Bernhard Paolini then introduced the incoming IOA President, Dr. Saad Jasim and passed on the traditional “IOA Chain” which contains the name of all IOA Presidents. Dr. Jasim thanked the IOA for its support and spoke of the challenges to IOA caused primarily by climate change.



*Incoming IOA President, Dr. Saad Jasim accepts Presidential chain from outgoing IOA President Bernhard Paolini*

## A Great Time at the Nice World Congress!

On October 20-25, 1019, 246 delegates from 48 countries gathered in Nice, France at the Hyatt Regency Nice Palais de la Méditerranée for the 24th International Ozone Association World Congress & Exhibition.

Delegates were treated to a delightful hotel in a beautiful location, just across the street from the Mediterranean Sea. One only had to go outside the hotel and stroll along the beach on the Promenade des Anglais to experience the vibrancy of Nice and its citizens.

Delegates were welcomed on Sunday to the opening reception which featured Nice specialties and wines from Provence.

On Monday, October 21, IOA President Bernhard Paolini formally opened the conference and welcomed delegates. EA<sub>3</sub>G President Frédéric Violleau then offered his welcome and reviewed the IOA World Congresses which had been held since 1973. He reviewed the mission of the IOA and of ozone and its applications. He then summarized the conference and exhibition and recognized and thanked sponsors, exhibitor's and the conference committee members.



*Dr. Frédéric Violleau offers welcome to congress*

Conference Technical Chairman, Prof Michel Roustan then summarized the conference objectives and the technical program. Dr. Renate Viebahn then summarized the medical ozone program which was being held as part of the World Congress.

Following the introductions, the IOA General Assembly was held where Dr. Saad Jasim was introduced as the new IOA President. Dr. Jasim thanked the IOA for their support and spoke of the challenges to IOA and ozone, namely climate

change, cyanotoxins and water reuse. He then introduced the next IOA World Congress in Windsor, Ontario, CA in August 2021.

### Keynote Addresses

Following a coffee break in the exhibit hall, three keynote addresses were offered:

Michel Roustan “*Ozone and Nice, a nice story!*” reviewed the use of ozone in Nice, beginning with the world’s first ozone installation for water treatment in 1907. In the area ozone is now used for wastewater treatment (Sophia Antipolis) and drinking water (Super Rimiez). It is also used in aquatic sports (Eauzone Nice), to disinfect headphones and for laundry applications.



*Prof. Roustan reviews the use of ozone in Nice*

Barry Loeb reviewed “*Forty years of advances in ozone technology. A review of Ozone: Science & Engineering*”. The history of how the journal has covered the advances in ozone technology and even led research was presented. An introduction to the Water, Energy, Food Nexus was given, and suggestions offered on how the IOA can participate in addressing the nexus.

Bernhard Paolini summarized European regulations affecting ozone in his presentation “*Outlook – Acting in a regulated market*”. He presented an update on Euro<sub>3</sub>Zon and the biocidal product regulations. Euro<sub>3</sub>Zon has submitted a dossier for the use of ozone as a biocide and it is now anticipated that authorization will not occur before 2024. The severity of these regulations could change the direction of future research.

### Technical Program

The technical program consisted of three parallel sessions with three keynote lecture, 85 long papers, 23 poster presentations and 6 workshops. The following technical topics were covered:

- Ozone in the water cycle
- Design and Engineering
- Ozone Generation and Measurement
- Applications in Drinking Water
- Fundamentals (3 sessions)
- Ozone in Medicine (4 sessions)
- Ozone in Agrifood (2 sessions)
- New Challenges in Wastewaters (3 sessions)
- Applications in Industrial Processes (2 sessions)
- Workshops
  - o Young Ozone People
  - o CFD Modeling
  - o Feed Gas for Ozone Generators
  - o Ozone Plant Design
  - o Ozone in Medicine
  - o Innovation



*Dr. Achim Ried talks on the benefits of CFD*

Computational fluid dynamics (CFD) was given considerable attention in this conference. Dr. Achim Ried introduced how advance modeling via CFD can enhance ozone system design. A critical factor in the CFD modeling exercise is the bubble size. Dr. Daniel Smith reviewed the emerging operational challenges to ozone applications. Recent water reuse applications have required higher than typical ozone doses – ranging from 7 mg/L to 30 mg/L in the bulk flow. In addition, many plants require contactors to operate at turndowns as high as 131:1. The use of CFD modeling to address this was reviewed as well as a new design for a cross-plane sampling mechanism for ozone residual sampling. Those interested in CFD then had an opportunity for in-depth discussions in a

following workshop dedicated to the topic.

There is renewed interest in ozone generation by vacuum ultraviolet (VUV) radiation from xenon excimer lamps with a wavelength around 172 nm. Felix Baker, ZED, reported on his company's progress in this area resulting in the development of a ZED generator as an alternate to conventional ozone generators. Nicole Brüggemann, Xylem, highlighted many advantages of Xenon Excimer lamps including high ozone concentrations, high gas pressures, and no concerns of nitrogen oxide formation when using air feed gas. In a prototype unit, ozone concentration of 16 % has been achieved with air feed and 47% with oxygen feed.

Bram Martijn, PWM Water Supply Co., The Netherlands reviewed their project for pharmaceutical control by applying suspended ion exchange and ozonation. The process was successful in degrading the target compounds; when an ozone residue was present, high concentrations of bromate were observed.



*Chris Hunyh reviews ozone treatment in Switzerland*

Chris Hunyh, SUEZ, summarized the use of ozone for micropollutants treatment, including Switzerland. The positive results from using ozone, options for where to use ozone in the treatments process and the cost of treatment were covered.

In the session on drinking water, Dr. Saad Jasim provided a keynote address addressing the effects of climate change on water treatment technology and the challenges it will provide including the increasing priority on cyanotoxins and needs for water reuse. Antibiotic resistance is becoming a global threat and most wastewater treatment plants are not equipped to handle the emerging contaminants.

Eric Chauveheid, Vivaqua, Belgium, reported on the removal

of micro-pollutants by combining ozone and active carbon filtration at a full-scale drinking water production plant in Belgium. It was concluded that advanced oxidation used for decades in the drinking water industry behaves similarly to a final ozonation step applied today to treated wastewater effluents.

Ilya Tkachenko, Moscow State University, described a two-stage ozonation-adsorption process for treating ground water containing trichloroethylene and tetrachloroethylene. The ozonation-sorption process removed 97% and 93% of TEC and PCE respectively.



*Ilya Tkachenko presents process for ground water treatment*

In a session devoted to wastewater treatment, Dr. Sylvie Baig (Suez) reviewed their work on the TRIUMPH project (Treatment of Urban Micropollutants and Pharmaceuticals in Wastewaters). This project is focused on developing a process for wastewater treatment consisting in the integration of ozone oxidation with aerobic biological treatment. This was a major project with six partners. Tim Pühmeier, (Xylem) surveyed the situation in Switzerland, where reduction of micropollutants in wastewater is required by law. The operations of the wastewater treatment plant Werdhölzli, Zurich, which uses ozone and aerobic biological treatment were summarized.

### ***Agri-Food Applications***

There were 15 agri-food papers and posters presented over two sessions. These were heavily supported by researchers at Ecole d'Ingénieurs de Purpan and by De Nora Water Technologies.

Maëlie Heuls, Purpan, reported on degradation efficiency of three pesticide's on loaded wheat seeds by different oxidation techniques. In this study, gaseous ozone was effective in reducing the pesticides but ozone and electrolyzed water were



not.



*Maëlie Heuls reports on pesticide degradation in wheat*

Julien Vinet, Purpan, described the design of a process for synthesizing and analyzing ozonated sunflower oils. Cristian Carboni, De Nora, reviewed ozonization of meat processing environments. Bacteria present could be significantly reduced with 20-40 ppm ozone. Mr. Carboni also reported on the effectiveness of ozonated water treatment on microbial control and storage quality of different citrus fruit species.



*Julien Vinet describes process for ozonated sunflower oils*

### ***Young Ozone People Workshop***

A special workshop was held to address the needs of the Young Ozone People (YOP), led by Marielle Pages. The purpose of the workshop was to assist the young ozone people in becoming active in the IOA and to share positive experiences from that activity.

Wim Audenaert, CEO of AM-Team described his career starting as an ozone researcher, becoming active in IOA conferences and helping found the Young Ozone People. The AM-Team specializes in CFD modeling and bromate modeling for water and wastewater treatment plants. He shared the positive effect of IOA on his career.

Tony Merle, EAWAG, shared his experience with developing the MEMBRO3X process and the advantages of attending IOA conferences.

Cristian Carboni, DeNora, spoke summarized the tremendous potential for networking at IOA events.



*Cristian Carboni addresses Young Ozone People*

Michel Roustan spoke as the senior representative in the workshop and his experience with ozone mass transfer and emphasized that the fundamentals of hydrodynamics, mass transfer and kinetics are still critical in design ozone systems in conjunction with CFD analysis.

Finally, the YOP were asked to gather and plan the concept for an YOP event in 2020.

### ***Ozone in Medicine***



Medical applications of ozone was a separate conference within the World Congress organized by Dr. Renate Viebahn. Approximately 45 delegates attended four technical sessions and two workshops organized as follows:

- Introduction, clinical trials in topical ozone application
- Inflammatory diseases
- Pain
- Case reports, preclinical trials
- Workshop: Ozone in inflammatory conditions
- Workshop: Ozone in dentistry

The technical program opened with Dr. Viebahn welcoming attendees and summarizing the low-dose concept and the role of glutathione. Dr. Olga Sonia León Fernández (University of Havana, Cuba) reviewed the use of ozone for treatment of rheumatoid arthritis. Dr. Zaid Fahmy (August Klinik Bad Kreuznach, Germany) reported on his study of treating patients with knee osteoarthritis with ozone injections.



*Dr. Olga Sonia León Fernández discusses use of ozone in treating arthritis*



*Dr. Phillip Mollica reviews use of ozone for dentistry*

In the dental workshop, Dr. Wilhelm Schüller (Germany) reviewed the use of ozonized water and ozone ointment in dentistry and dental surgery. Practical procedures in the use of ozonized water and ozone ointment in all fields of dentistry were given. Dr. Phillip Mollica (USA) discussed the use of ozone with photon-induced -acoustic streaming for endodontic therapy.

### ***Innovation Workshop***

The final workshop held in the World Congress was an Innovation Workshop hosted by Prof. Chedly Tizaoui of Swansea University, Wales.



*Prof. Chedly Tizaoui opens workshop*

Funding in ozone research is becoming very limited and it is felt that ozone-related research is still dealing with classical topics. The purpose of the short workshop was to gauge the views of the ozone community on the current state of research and innovation on ozone and advanced oxidation processes and how these should evolve in the future.

Cristian Carboni, de Nora, discussed innovation in the food and beverage sector and where ozone should be playing a role. As mentioned in a conference opening keynote address, the three sectors, water, energy and food are closely intertwined, depending upon each other.

Sylvie Baig, SUEZ reviewed marketing data which showed the growth in ozone. The number of ozone related patents continues to grow with the largest number of patents still in water treatments. The largest percentage of growth in patents was in medical applications. Overall, ozone related sales are expected to have a compound average growth rate (CAGR) of 8% during 2016-2020, with ozone sales reaching \$1,242 million by 2020. The fastest growing group will be EMEA



(Europe/Mid-east/Africa).



Sylvie Baig reviewed innovation dynamics

Patricia Aubeuf-Prieur, Kemira Chimie, France introduced a new innovation, the use of performic acid for disinfection of wastewater by the KemConnect DEX process.

### Exhibition

There was a very nice exhibition for this World Congress. The exhibit hall was next to the registration desk and just across from the main meeting room. Conference coffee breaks and lunches were held inside the exhibit hall giving exhibitor maximum exposure to the attendees. The exhibit hall was lively even when technical sessions were occurring.



Companies exhibiting were:

Air Sep Corporation  
BMT Messtechnik GmbH  
De Nora Water Technologies  
Dr. J. Hänsler GmbH

Ecole d'Ingénieurs de PURPAN – Plateforme TOAST  
Institut Polytechnique UniLaSalle/LASALLEO3  
Statiflo  
SUEZ OZONIA  
Teledyne API  
Xylem  
ZED Ziegler Electronic Devices GmbH

The IOA thanks the exhibitors for their support.



### Closing Ceremony and Awards

Michel Roustan opened the ceremony announcing and presented several awards.

The award for the **Best Poster Presentation** was given to Sylvain Treguier, Sebaseien Cuq, Valerie Lemetter, Axel Canado, Marielle Pages, Cécile Levasseur-Garcia and Frédéric Violleau (France) for their poster/paper "*Vibrational spectroscopy as a tool for fast and on-line measurement of ozone concentration in water inside a reactor*"

The award for the **Best Paper** was given to Win Jie Lee and Teik-Thye Lim for their paper "*Synergistic micropollutants removal by hybrid oxidation separation technology (HOST): fabrication of ceria-functionalized ceramic membrane, performance evaluation and mechanistic study*"

The **Harvey M. Rosen Memorial Award** was established in 1989 to recognize the best paper published in OS&E during the two-year period between World Congresses. The winning paper for the years 2017-2018 was "*Design Considerations for Cost-Effective Ozone Mass Transfer in Sidestream Systems*". The authors are the late Kerwin Rakness, Glenn Hunter, Julia Lew, Bill Mundy and Eric Wert. Glenn Hunter and Eric Wert accepted the award from IOA Editor-in-Chief and and Glenn then provided a summary of the work and the accomplishments of Kerwin Rakness.





*Best Poster Award*



*Best Paper Award*



*Willy Masschelein Award*



*Honorary IOA Award*



*Morton J. Klein Award of Excellence*



*Harvey M. Rosen Award*

The **Willy Masschelein Prize** is to recognize original research revealing some unprecedented knowledge on any of the fundamental aspects of the industrial generation and the applications of ozone and derived oxidants. A selection committee reviewed several submittals (theses) for the award. The prize was awarded to Dr. João Gomes, university of Coimbra, France for his work *“Environmentally Friendly Removal of Water Emerging Contaminants by Photocatalytic Ozonation and Biofiltration”* and presented by Frédéric Violleau. Upon receiving the award, Dr. Gomes summarized his work.

IOA President Bernard Paolini then conferred two prestigious IOA awards.

**Honary Membership** was given to Professor Emeritus Daniel Smith, University of Alberta, Canada in recognition of his service to IOA. He has served as IOA-PAG President and as Associate Editor of OS&E and has led his students to many contributions to OS&E. He remains active in IOA as an International Board member and PAG Board member. Prof Smith thanked the IOA for the award and summarized the many benefits he has achieved from IOA.

The **Morton J. Klein Medal of Excellence** is an award of excellence to recognize contributions of the highest order to the International Ozone Association in commemoration of the clear vision, diplomatic proficiency, and unparalleled leadership which characterized the life of Morton J. Klein. The award was given to Dr. Sylvie Baig, SUEZ in recognition of her dedication to IOA. She has served at EA<sub>3</sub>G President, IOA President, Chair of the IOA Engineering Group and has been a leader in bringing young ozone people into the organization.

Following the awards, incoming President, Dr. Saad Jasim was again introduced who gave a preview of the next IOA World Congress in Windsor, Ontario, Canada.

Bernard Paolini then closed the World Congress by thanking attendees and complementing the organizers and presenters. He expressed his support for continuing workshops at future congresses and conferences.

### Technical Tours

Two technical tours were arranged, occurring after the closing of the World Congress.

The first tour occurred on Thursday and visited the Sophia Antipolis waster treatment plant near Valbonne. This plant



with a capacity to treat wastewater from a population of 50,000 was completed in 2012 and features biofiltration plus ozonation to remove micropollutants.

The second tour occurred on Friday and visited the La Verne drinking water plant in La Môle. The plant has a treatment capacity of 3,000m<sup>3</sup>/h and features two stage of ozonation and serves the Saint-Tropez region.

There was also time for sightseeing. For example, at the visit to Sophia Antipolis, half of the attendees visited the treatment plant while the other half visited the beautiful city of Valbonne. In between the two, a very pleasant luncheon was served.

### Social Activities



There were a number of social activities for relaxation and networking at the congress. IOA Board members met each other at restaurant Bocaccio for a very nice local paella. The opening reception was held at the Hyatt Regency. Unfortunately, it could not be held in the outside patio area due to possible inclement weather.





On the nights when there were no formal activities, there was no lack of options for socializing. Dozens of restaurants and bars were a short walk from the Hyatt, most with outdoor seating. As the prime summer traffic was gone, there was no difficulty in finding choice spots for dinner. Nice is a seafood lovers paradise, but a hamburger could also be found at the local Hard Rock Café.

The closing banquet was held at Le Grand Balcon, where the IOA took over the restaurant and were entertained with excellent food and wine and strolling entertainers.

Accompanying persons were offered cultural tours in Vieux Nice and Eze.



## Sponsors

Sponsors are key to the success of a World Congress as they help to defray costs and make it more affordable for attendees. The General Sponsor for this World Congress was **SUEZ Ozonia** who also sponsored a technical tour. **Xylem** was also a major sponsor. **Veolia** also sponsored a technical tour.

## Organizing and Scientific Committees

The success of the conference was due to the efforts of the

organizing and scientific committees. Committee members are listed below. Their efforts are deeply appreciated.

### Organizing Committee

Bernhard Paolini, Switzerland, Chair  
Frédéric Violleau, France  
Sylvie Baig, France  
Alain Lasalmonie, France

### Scientific Committee

Michel Roustan, France, Chair  
Dr. Saad Jasim, Canada  
Mr. Florencio Martin, France  
Dr. Frédéric Violleau, France  
Dr. Jean Stéphanie Pic, France  
Dr. Achim Ried, Germany  
Dr. Eric Chauveheid, Belgium  
Dr. Jean-Pierre Duguet  
Prof. Santiago Esplugas, Spain  
Prof. Stephan Brosillon, France  
Dr. Daniel W. Smith, Canada  
Mr. Chris Schulz, USA  
Dr. Sylvie Baig, France  
DR. Chedly Tizaoui, UK  
Prof. Maracia Dezottoi, Brazil  
Larent De Francheschi, France

### Medical Conference Committee

Dr. Renate Viebahn-Hänsler, Germany  
Dr. Shahzad Bhatti, Pakistan  
Dr. Aziz G. H. Aziz, UAE  
Prof. Olga León Frenández, Cuba  
Dr. Michael Schreiber, Germany  
Dr. Alberto Alexandre, Italy  
Dr. Umair Rashid, Pakistan  
Dr. Stefan Trion, Romania

### Proceedings

Copies of the proceedings (769 pages) are available on a smart stick from the EA<sub>3</sub>G Group. For pricing and more information, contact Béatrice Bernard at [ioa@esip.univ-poitiers.fr](mailto:ioa@esip.univ-poitiers.fr).

In conclusion, this was another very well run and successful World Congress. The topics of the conference and the location appealed equally to young ozone professionals and long-time IOA members. Congratulations to the organizers for such a nice event in Nice!



## NEW IOA MEMBERS

The International Ozonation Association takes great pleasure in welcoming our new members!

### CANADA

Benoit Barbeau  
Polytechnique Montreal  
CP 6079, succ. Centre-Ville  
Montreal, QC H3C 3A7

Darian Petrisca  
HOMES Water  
570 Windgrove Crescent  
Oakville ON L6L 4R6

### DENMARK

Mrs. Katrine FLINDT  
Qualimedics IOM klinikken  
Bistrup Hegnsvej 7 b  
Birkerød 3460

### INDONESIA

Ms. Mahdaleny TAN  
Biogenic Integrative Center  
Komp Taman Galaxy Indah. Jl. Taman Aster  
blok N4 No. 18  
Bekasi Selatan 17147

### ITALY

Dr. Francesco RAPONI  
Fondazione Francesco Raponi onlus  
Via Colleprata 10  
03011 ALATRI (Fr)

### PERU

Javier Paul Montalvo Andia  
Environmental Science and Technology Research Group  
San Pablo Catholic University  
Quinta Vivanco Nro. S/N Urb. Campiña Paisajista  
AREQUIPA 04000

### UNITED KINGDOM

Jeremy Barraciough  
Biofresh Group Ltd  
Unit 16 Park Valley Mills, Meltham Road  
Huddersfield  
West Yorkshire HD7 5DR

### UNITED STATES OF AMERICA

Wade Hubbard  
Barnhardt Manufacturing  
1100 Hawthorne Ln.  
Charlotte, NC 28205

Joseph Krawczyk  
Pro O2 LLC  
3113 Cambridge Cir.  
Trussville, AL 35173

## Upcoming IOA Meetings

### 2020

**August 17-20, 2020, IOA Pan American Group Regional Annual Conference**, South Point Hotel and Casino, Las Vegas, NV. Information: [www.ioa-pag.org](http://www.ioa-pag.org).

### 2021

**August 30- September 3, 2021, IOA 25th World Congress and Exhibition**, Caesars Windsor Hotel and Casino, Windsor, Ontario, Canada. Future information will be available in Ozone News or [www.ioa-pag.org](http://www.ioa-pag.org)

## Upcoming Meetings of Other Organizations

### 2020

**March 8-11, 2020 2020 IUVA Americas Conference**, Disney Coronado Springs, Orlando, FL. **Abstracts due October 11, 2019.** Information: [www.iuva.org](http://www.iuva.org)

**May 4-8, 2020, IFAT Munich**, Information: [www.ifat.de](http://www.ifat.de)

**June 14-17, 2020, AWWA Annual Convention and Exposition (ACE20)**, Orange County Convention Center, Orlando, FL. Information: [www.awwa.org](http://www.awwa.org)

**June 23-26, 2020, 8th International Ozone Applications Symposium**, Varadero, Cuba. The conference will focus on ozone research, ozone therapy, ozonized vegetable oil, veterinary medical applications and applications of ozone in food and pharmaceutical industries. Information: [www.8simposio-ozono@cnic.edu.cu](mailto:www.8simposio-ozono@cnic.edu.cu)

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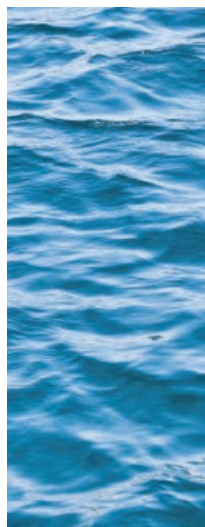
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