AMS Newsletter

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Highlights

Want to learn about AMS?

Visit:
http://www.sam-ptf.com/index.html

Become AMS member?

Send application to AMS President, Dr. Abdoulaye Doucoure:
ablodoucoure@hotmail.com

AMS Newsletter Submissions

Please send news, announcements and other contributions for the newsletter to the Editor, Dr. Sidy Ba:
Sidy.Ba@USherbrooke.ca
Your contribution shall be included in the next issue of the newsletter.

Editorial notes

Edward Nxumalo
Associate Professor
University of South Africa

The 2nd African Membrane Society International Congress (AMSIC-2) will be held in the City of Johannesburg (South Africa) **from the 29th of July to the 1st of August 2018**. The AMSIC-2 will be hosted by the Nanotechnology and Water Sustainability (NanoWS) Research Unit of the University of South Africa (UNISA) The NanoWS Research Unit is situated in the UNISA's College of Science, Engineering and Technology at the Science Campus in Florida (West of the City of Johannesburg). The NanoWS Research Unit has various focus areas of research under which numerous strategic projects relating to nanotechnology and water research are developed. Research topics that will be addressed during AMSIC-2 include, among others:

- UF, NF, RO, FO and mixed matrix membranes (fabrication and applications),
- Fabrication and modification of ceramic, ceramic-polymeric and hollow fibre membranes,
- Composites, nanocomposites, nanomaterials in filtration,
- Membranes coupled with renewable energy sources,
- Hybrid membrane filtration systems.

This event aims to capture key technological advances in fields heavily dependent on membrane filtration such as Water, Biotechnology and Biomedical sciences, Microelectronics, Chemical Manufacturing, Oil and Gas, and Power Generation.

As for membrane studies devoted to water, we will consider water purification projects, analytical/environmental research, urban water cycle and rural community development as well as bioremediation and analysis. The NanoWS research Unit is therefore well poised to host the AMSIC-2. We look forward to welcoming you to the City of Johannesburg in 2018!

AMS activities and news

AMS introduction to European Membrane Society (EMS) new Council

The African Membrane Society congratulates **Prof. Christiana BOI** (Universiti of Bologna, Italy) following her recent election as President of EMS.

We will stay in close contact with Christiana and her team and are looking forward to a productive relationship between both organizations. EMS Past President, Prof. Bart Van der Bruggen (Dept. Chem. Eng., KU Leuven, Belgium) invited Dr. Abdoulaye Doucoure to an inaugural meeting of the EMS Council, where he gave a speech. Prof. Van der Bruggen felt it was important to maintain a strong relationship between both organizations, a view also held by Dr. Abdoulaye. The latter thanked Prof. Van der Bruggen for his determination to help improving AMS' visibility within the global membrane community and for sponsoring its events. "We wish him a continued success in his new endeavors and will remain in contact" he added.

AMS key initiatives in 2016 and outlook for 2017-2018

The year 2016 has been an uplifting year for AMS, starting with the enrollment of new members located in Europe, Asia and Africa (Tanzania, Egypt, Ethiopia, South Africa, Tunisia, Mali, Senegal and Ghana), which led to a 10% increase in membership. Our website has been enriched with content focused more on membrane projects which are conducted in Africa - including two newsletters focusing on AMS. Finally, AMS held its first international venue (AMSIC-1) in Tunisia in partnership with the *Faculté des Sciences de Sfax*, from May 3rd to 5th, 2016. Many organizers devoted countless hours of work to make it a success. Everyone was relieved and delighted by the level of productivity, the accomplishments and the memorable reception. The venue was a critical milestone for the AMS community and we are thankful to everyone who supported us during this challenging journey.

What are the next steps in 2017 and 2018? Well, AMS commits to undertake the following actions:

- Write Newsletters #3 and #4;
- Publish original research and review articles related to membranes & environment in scientific peer reviewed journals;
- Facilitate online audio-video seminars organized by members (at least one);
- Partnering with the organizers of Francofilt meeting to be held in Bordeaux (August 29th – 31st, 2017 by IFTS, University of Bordeaux, CNRS, etc) https://francofilt2017.sciencesconf.org/;
- Prepare for election of new AMS Board (2nd semester of 2017);
- Prepare for AMSIC-2 (City of Johannesburg, South Africa, July 29-Aug 3rd, 2018).

Board members of AMS can be elected for up to two three-year terms. We are eager to prepare for this election and are excited about the prospect of bringing talented individuals to the organization.

Aside from these priorities, we are committed to getting more AMS members involved, hopefully inspiring, creating opportunities for and giving visibility to new volunteers and especially our early-career filtration experts.

Lastly, the Board has been brainstorming about publishing a series of technical booklets aimed at disseminating knowledge about membranes, filtration, energy and water technologies by illustrating research/teaching materials from faculty and professional participants in Africa. We plan to kick start this initiative during the 4th quarter of 2017. **Any support, ideas or sponsor will be highly appreciated!**

Announcements

Bakary Dembelé is the **first graduate student of the "*Université des Sciences Techniques et Technologiques de Bamako (USTTB)*" in Mali** to defend a doctoral thesis in the field of membrane science. **Bakary's PhD research dissertation** is entitled ***"Treatment of Mali Drainage Mining Water by Nanofitration"*** and his defense took place on August 1st 2016 in Bamako during the Mali Symposium on Applied Sciences http://msas2016.ml/. The reviewers were Amadou Hama Maiga (Former General Director of the International Institute for Water & Environmental Engineering in Ouagadougou – Burkina Faso) and Sylvie Condom (Faculty at the *"Institut Européen des Membranes"* of Montpellier, France). His research thesis was co-advised by Adama Tolofoudyé (Head, Département de Génie Chimique, USTTB, Mali) and Abdoulaye Doucouré (President of AMS and Manager, Hollingsworth & Vose Company, Virginia USA). Dr. Dembelé has been recruited by USTTB's Department of Chemistry to teach at the undergraduate level and pursue research in the field of materials sciences and the engineering.

Hafedh Saidani (Dr) - New position

AMS congratulates Dr. Saidani for his new appointment and it wishes him an enduring success in his new role. After 7 years of experience at the *Institut de la Filtration et des Techniques Séparatives*, Dr. Saidani joined Novasep in January 2017 to resume his new role in membrane technology and purification processes. Novasep is a leading worldwide provider of integrated manufacturing solutions for the life science industries. The group is widely recognized for its expertise in the industrial production of molecules (bio-and synthetic molecule) and purification of active pharmaceutical ingredients. Dr. Saidani is incharge of membrane technology at Novasep and will also work with customers in the design and realization of unit operations and purification processes. Also, providing turnkey solutions for production lines for the food and bioresources industries.

Young researchers

In 2016, students from the Unité de Développement des Equipements Solaires [Solar Equipment Development Unit] (UDES) in Bou-Ismail, Algeria, have successfully defended several Master theses. Topics addressed issues of wastewater treatment and desalination, as reflected by the thesis titles:

1. Study of coupling Adsorption / Photocatalysis for the treatment of polluted water in a fixed bed reactor. ***Amazigh Sahraoui and Smail Nuoissi*****,** Master thesis in Chemical Engineering: University of Science and Technology Houari Boumediene / UDES, Center for the Development of Renewable Energies, June 2016. Adviser: Djilali Tassalit.

2. Design and production of a new solar photoreactor for the treatment of recalcitrant pollutants. **Bradai *Manel and Kissarli Abd el-Hakim***, Master thesis in Chemical Engineering: University of Science and Technology Houari Boumediene / UDES, Center for the Development of Renewable Energies, June 2016.Adviser: Djilali Tassalit.

3. Comparative study of the degradation of paracetamol in two photoreactors and optimization by experimental design. ***Nour elimen Bendjebbas and Hayat Ghebghoub***, Master thesis in Chemical Engineering: University of Science and Technology Houari Boumediene / UDES, Center for the Development of Renewable Energies, June 2016. Adviser: Nadia Chekir.

4. Experimental and numerical study of the performances of a single slope distiller coupled to planar solar collectors. ***Yousra Abdelbaki and Osama Kritli***, Master thesis in Chemical Engineering and Catalysis, University Blida / UDES, Center for Renewable Energies Development, June 2016. Adviser: Zahia Tigrine.

5. Photocatalytic degradation of organic pollutants by solar radiation. ***Fairouz Khebil and Nabila Zenibaa***, Master thesis in Chemical Engineering: University of Science and Technology Houari Boumediene / UDES, Center for the Development of Renewable Energies, June 2016. Adviser: Aoudjit Lamine.

6. Processing of organic pollutants on two solar photocatalytic supports. ***Madina Belmihoub and Houria Habbi***, Master thesis in Chemical Engineering: University of Science and Technology Houari Boumediene / UDES, Center for Renewable Energies Development, June 2016. Adviser: Nadia Chekir.

Membrane technologies/processes in Africa : Centre de Développement des Energies Renouvelables [Renewable Energy Development Center]

Présentation de l'Unité de Développement des Equipements Solaire du Centre de Développement des Energies Renouvelables

Nachida Kasbadji Merzouk (Dr) and Zahia Tigrine

L'Unité de Développement des Equipements Solaires (UDES, Bou Ismail, Tipaza), est affiliée au Centre de Développement des Energies Renouvelables (CDER). Ces missions principales sont axées principalement sur la réalisation des travaux de conception, de dimensionnement et d'optimisation des équipements en énergies renouvelables pour la production de la chaleur, l'électricité, le froid et le traitement des eaux. L'UDES est organisée en deux divisions dont la division Froid et Traitement des Eaux par Energies Renouvelables qui contient deux équipes de recherche savoir, l'équipe de Valorisation et de l'Epuration des Eaux de Rejets (EVER) et l'équipe de Distillation et Dessalement des Eaux Saumâtres et de Mer (DDESM).

Site de l'UDES/CDER, Http://udes.cder.dz

Cette dernière s'attèle à réaliser des projets de recherche permettant le développement et le test des techniques membranaires dont la réponse à la charge énergétique provient de systèmes à énergie renouvelable.

Dans ce cadre-là, l'équipe DDESM s'est équipée d'un pilote d'osmose inverse afin de caractériser à travers différents essais expérimentaux, le dessalement d'eau saline dont la concentration en chlorure de sodium varie dans la gamme $5 \leq sal\ (g/l) \leq 30$ en fonction de pression imposée, [1]. La figure suivante présente l'installation de l'unité d'osmose inverse de faible capacité dans le laboratoire de notre équipe UDES/CDER. Le pilote contient une membrane spiralée (1000 PSI (70bar) Feuille de Membrane Résistante FRP) placée dans un carter dont les caractéristiques sont données au tableau 1, [2]. Les différentes caractéristiques de fonctionnement du système sont illustrées sur le tableau 2, [3].

Pilote Osmose Inverse

Réservoirs de stockage
(Permeat, Retentat et eau brute)

Unité de filtration à deux cartouches

Armoire électrique et écran LCD de controle

Pilote d'osmose inverse installé au laboratoire de l'équipe DDEMS.

Table 1 : Limites maximales de fonctionnement de la membrane testée

Membrane	**Unit**	**OI Model SEA5-4040**
Pression maximale	bar	69
Pressure drop	bar	0.7
Surface	m^2	7.9
pH toléré pendant le fonctionnement		3 à 10
Température	°C	45
Concentration en chlore	ppm	<0.1
Turbidité de l'eau d'alimentation	NTU	1.0
Eau d'alimentation SDI	15min	<5
Rapport minimal entre le débit du concentré et celui du perméat pour tout élément		5:1

Table 2. : Données techniques d'exploitation

Données techniques		**Critères et design**	
Flux de perméat	84 l/h	TDS	<35000 ppm
Pression de service	55 bars	temperature nominale de fonctionnement	18 ° C
Consommation d'eau brute	1651/h	Inlet pressure of Need	Au moins 3 bar
Pression de l'eau brute	3-5 bars	Operating pressure requirement	67 bar max
Rejet	99%	Flow	16 L / m² / h
Actuel	230V/50 Hz	SDI	<3
Puissance installée	3 kW/500 A	Iron	<0.01mg / lt
Raccord de tuyauterie	Eau brute : DN 15	Manganese / Aluminium	<0.025 mg / lt
	Perméat : DN 15	Barium Strontium	Très faible
	concentration : 15 DN	Bore	no
Dimensions	H*W*D=179*90*44 cm^3	Silica	<20

Plusieurs tests ont été effectués au sein du laboratoire comme l'étude de la variation du débit du perméat et du rétentat en fonction de la pression pour une salinité du puit de 1g/l ainsi que la variation du débit de perméat en fonction de la pression pour différentes salinités. L'installation du couplage de ce pilote avec les énergies renouvelables telles que présentées sur le schéma suivant et en cours de réalisation.

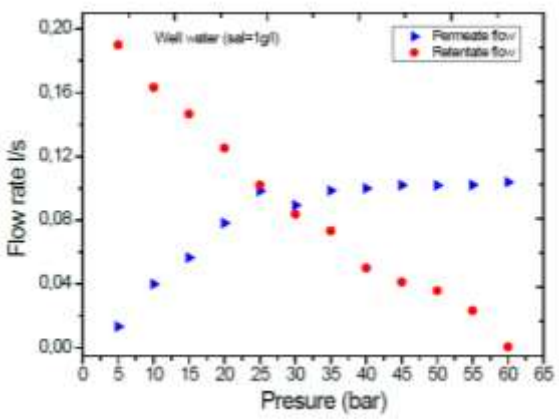

Fig. 5 : Variation du débit retentat et perméat en fonction de la pression, [3]

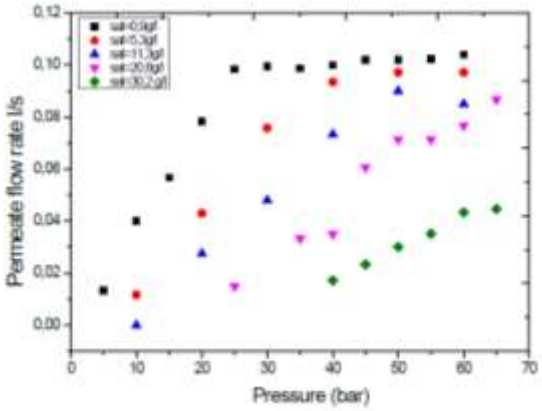

Fig 4 : Variation du debit du perméat en fonction de la pression pour différentes salinité, [4]

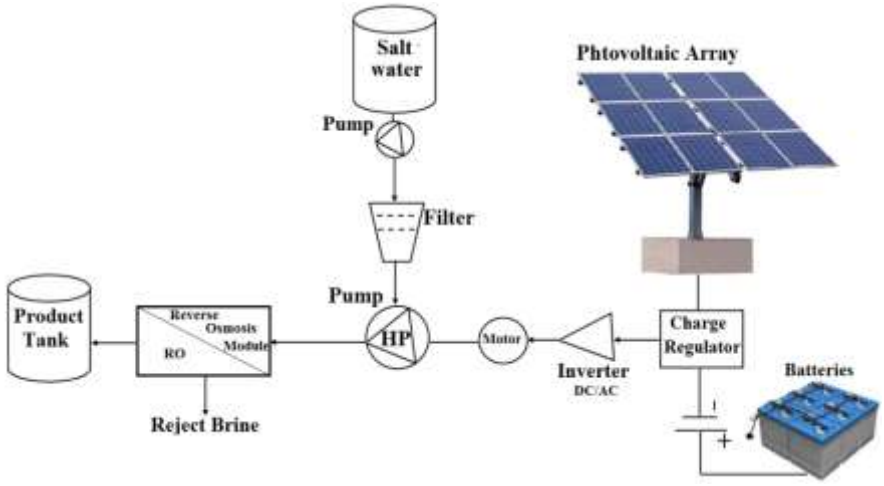

Figure 5 :

Schéma du couplage du pilote d'osmose inverse avec l'énergie photovoltaïque, [1]

Réfrences:

1. Z. Tigrine, N. Kasbadji Merzouk, H. Aburideh, M. Abbas, D. Zioui, D. Belhout, S. Hout, Pilot-Scale Reverse Osmosis for Brackish and Seawater Desalination Coupled with Renewable Energy. International Journal of Environmental Science, 1, 350-356
2. Z. Tigrine, H. Abuhideh, M. Abbas, S.Hout, N. Kasbadji Merzouk, D. Zioui, M. Khateb, Membrane Desalination Technology in Algeria : Reverse Osmosis for Coastal Areas, 7th International Exergy, Energy and Environment Symposium, 26-30 avril 2015
3. N. Kasbadji Merzouk, Z. Tigrine and D. Tassalit L'appoint des énergies renouvelables au dessalement, Conférence AMSC1, l'exploitation des procèdes membranaires pour le traitement de l'eau dans les petites communautés et les centres urbains, Faculté des Sciences de Sfax, 3-5 mai 2016
4. Z. Tigrine, N.Kasbadji Merzouk, H. Aburideh, M. Abbas, D. Zioui, D.Belhout, S.Hout, M. Khateb, Characterization of pilot-scale desalination reverse osmosis membrane coupled with sustainable energy source. Conférence AMSC1, l'exploitation des procèdes membranaires pour le traitement de l'eau dans les petites communautés et les centres urbains, Faculté des Sciences de Sfax, 3-5 mai 2016

Our partner's corner

Envisioning a mutually beneficial partnership between International Water Association (IWA) and African Membrane Society

Roger Ben Aïm (Dr)
Distinguished Fellow of IWA
Member of IWA Strategic Council

IWA is the largest and the most representative international association in the field of water in the world. It embraces all the aspects of water activity from pure water to waste water, from scientific to industrial aspects, from water quality to water management (http://www.iwa-network.org/).
IWA has members in 130 countries in the world, including 53 African countries (including Kenya, Malawi, Morocco, Mozambique, Namibia, Tanzania, Uganda). In 2015 a UN summit adopted a set of goals as a part of a new development agenda, i.e. the "Sustainable Development goals" to be reached by 2030 (http://www.un.org/sustainabledevelopment/development-agenda/). IWA strongly supports this approach through a resolution entitled "*Effective contribution of water professionals to the achievement of Sustainable Development Goal 6 and all water-related Targets of the 2030 Agenda for Sustainable development*". IWA action will be mostly focused on Goal 6 : Clean water and sanitation, which goal is to "*Ensure availability and sustainable management of water and sanitation for all". Today:*

- *50% or less people have access to potable water in several developing countries including several African countries*
- *34% of the world's population lack basic sanitation facility and this percentage increases to 56% in sub-Saharan Africa*

We all agree that membrane technology should play a role in clean water production as in wastewater treatment and reuse. The AMS International Conference in Sfax, Tunisia last year confirmed the important role of membranes in sustainable water management: this was a proof of the dynamism of the sector not only in research but also in industrial activity as several Subject Matter Experts attended the exhibition.
It is important that IWA and AMS join their effort and work hand in hand to achieve mutual goals.
This could be made easier in 3 ways

- IWA officers are present in Africa and they could help in the process of conducting joint actions. IWA-Africa contact person: sarah.tibathemwa@iwahq.org ;
- IWA Specialist group on Membrane Technology is very active and would surely agree in joint actions with AMS such as the organization of a joint regional conference that could take place in 2018;
- IWA networking platform is a fantastic forum for keeping in touch with the whole water and wastewater specialists' community.

Finally, universal access to Clean Water and Sanitation goal is a real challenge particularly in Africa: only 13 years remaining for reaching this milestone! This implies the mobilization of all of us.

Let us start the job!