

## To all SACAA members

This issue opens with data confirming the rapid growth of the construction sector in the USA. It would appear that the recessionary trend has been broken.

The American Coal Ash Association has awarded their scholarships for 2017. It is noteworthy that from undergraduate to postgraduate level students have come up with innovative assignments.

Several new patents are available for novel applications; whether it be an additive for concrete or for the recovery of alumina and rare earths. By the way, rare earths will become the new "hot topic" as they are indispensable to the electronics industry.

From an environmental aspect it is most pleasing to learn that a largescale carbon capture and storage demonstration project is about to become a reality and that coating technology can play a role in improving the efficiency of power generation.

Finally, renewable energy is a concept that is being bandied about. Hopefully the available on-line course will help to improve understanding.

*Richard*

**Richard Kruger, Past-President: SACAA**

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### ➤ **Construction spending in the USA at a 10-year high**

Bolstered by more infrastructural projects, US non-residential construction was up nearly 5% in November, helping to move construction spending to numbers not seen in a decade. The US Commerce Department reported that construction spending reached \$1.18 trillion in November 2016 the highest level seen since April 2006. Federal data confirms November the increase as 0.9% higher than October and up 4.1 % from the year before. Street and highway construction spending was up 10.5% in November 2016 as compared with November 2015. In a statement, officials from the Associated General Contractors of America say the new data indicates that the construction outlook for 2017 is favourable but cautioning that demand will vary for different types of construction projects.

### ➤ **Novel inorganic additive for concrete developed in Switzerland**

Nanogence, a start-up firm associated with Ecole Polytechnique Federale de Lausanne (EPFL) has developed an additive that can give concrete, mortar, and cement the desired consistency in a single formulation while increasing the compressive strength and improving durability. Kumar Abhishek, a doctoral student at the university is CEO of Nanogence which holds the patents.

Abhishek performed research on the nanoscopic structure of concrete as part of his thesis work at EPFL. Using this concrete knowledge, he developed the additive, the chemical nature of which is proprietary. The company says it could take the place of a number of additives currently used to modify cure time and texture.

<http://actu.epfl.ch/news/a-unique-additive-for-the-ideal-concrete/>

### ➤ **The 2017 ACAA bursars and their research**

The American Coal Ash Association Educational Foundation has awarded \$9 000 in scholarships for 2017 to three university students with interests in advancing the sustainable and environmentally responsible use of coal combustion products.

Gang Xu, P.E., a PhD candidate in Civil Engineering at Washington State University, was selected to receive the \$5 000 David C. Goss Scholarship. Xu is researching an environmentally friendly pervious concrete using fly ash modified by graphene oxide as the sole binder.

Jenberu Feyyisa, a Civil and Environmental Engineering graduate student at University of Charlotte, North Carolina was selected to receive the \$2 500 John Faber Scholarship. Feyyisa is researching an innovative approach using organo-silane chemicals to modify ash surface to decrease the wettability and form a water repellent surface.

Sarah Hodges, a sophomore studying Chemical Engineering at University of Kentucky, was selected to receive a \$1 500 ACAA scholarship. Hodges is engaged in research using ash from the Kingston power plant to create calcium sulfo-aluminate cement.

### ➤ **Saudi Arabia renewables**

Saudi Arabia has launched the first stage of its ambitious renewables tenders which includes 400 MW of wind projects and 300 MW of solar plants. The kingdom plans to achieve 3.45 GW of renewables by 2020 and 9.5 GW by 2023. The Minister of Energy, Industry and Mineral Resources, said that "this marks the starting point of a long and sustained programme of renewable energy deployment in Saudi Arabia, that will not only diversify the power mix but also catalyse economic development and support long-term prosperity".

**Kelvin Ross, Editor PEI International, 20/02/2017**

### ➤ **Surface repels all types of liquids**

A surface texture being developed by UCLA engineers can reportedly repel all liquids, no matter what the surface. The so-called super-omniphobic texture of the surface resists fouling and withstands high temperatures. Such a surface could have infinite applications, from corrosion prevention to anti-fouling, of solar panels and building exteriors. Scientists are also looking at a variety of biomedical and industrial applications. According to UCLA's Henry Samueli School of Engineering and Applied Science the repellence relies on the physical attributes of the texture and not the substrate itself. For full details on this fascinating research see:

**Science, 28 November 2014, Vol 346, No 6213, pp 1096-1100 (DOI: 10.1126/science.1254787)**

### ➤ **Coating to improve efficiency of power generation**

A new nano-engineered coating for power plants, with the potential to save millions of dollars in fuel, and avert thousands of tons of carbon dioxide emission, has been developed at MIT. After applying the coating, water is easily shed, steam condenses faster and more efficiently so that less fuel is burned.

Two thousand times thinner than a sheet of paper, the coating causes water droplets to bead up and roll off, self-shedding the blanket of steam that normally envelopes (and slows down) condensers. According to MIT the coating is so thin that it doesn't block condensation, and is strong enough to survive years of steam exposure due to the MIT team's development of a covalent-bonding process that is significantly more stable than previous coatings. The new coating can be applied to condenser materials by means of chemical vapour deposition which was developed by the Gleason Lab at MIT. The technique is a single-step, low-energy vapour-phase method that allows extremely thin coatings to be deposited and consumes a very small amount of raw materials. Because it is vapour-based, instead of flow- or spray-based, there is no need to fit spray nozzles or other equipment inside a heat exchanger or other complicated geometry.

A paper on the research: **"Stable Dropwise Condensation for Enhancing Heat Transfer via the Initiated Chemical Vapor Deposition (iCVD) of Grafted Polymer Films," was published in Advanced Materials, Volume 26, Issue 3, pp 418–423, 22 January 2014**

### ➤ **Canadian fly ash patent commercialised**

Orbite Aluminae Inc. is an innovative clean tech company whose developments are predicted to produce alumina and other high-value commodities, such as rare earth metals, with the lowest environmental impacts and costs in the industry. Their portfolio includes 15 patents and 98 pending patent applications in 11 different countries..

Their most recent patent approved by the Canadian Intellectual Property Office (CIPO), Patent Number 2,862,307, allows Orbite to develop their unique process for treating fly ash. The patent covers the recovery and selective extraction of valuable materials using chloride-based technology. The technology, recovers all the valuable materials. Besides alumina, magnesia, titania and gallium the other rare earth materials can also be recovered.

CEO of Orbite, Glenn Kelly said, "Fly ash monetization represents a significant opportunity that we intend to seize and exploit as a key element of our global growth strategy. We have requested and received approval for accelerated patent application examination and issuance processes following a positive International preliminary report on the patentability. Consequently Orbite anticipates patents to be granted in additional jurisdictions for the commercialisation of the technology.  
<http://www.orbitetech.com/English/Home/default.aspx>

### ➤ **Carbon capture and storage in Texas**

Petra Nova Parish Holdings, a joint venture between NRG Energy and JX Nippon Oil and Gas Exploration, will retrofit a CO<sub>2</sub> capture plant at the W.A. Parish Generating Station southwest of Houston Texas. The project will demonstrate the ability of the CO<sub>2</sub> capture technology supplied by Mitsubishi Heavy Industries (MHI) which is able to capture 90% of the CO<sub>2</sub> emitted from flue gas stream. The process, jointly developed by MHI and the Kansai Electric Power Company uses the proprietary KS-1™ solvent that has a low level of solvent consumption.

The project is designed to capture and store 1.4 million tonnes of CO<sub>2</sub> per year and will be the largest post-combustion CO<sub>2</sub> capture project installed on an existing coal-fired power plant. This project has the potential to enhance the long term viability and sustainability of coal-fired power plants across the United States and worldwide. The University of Texas, Bureau of Economic Geology will design and manage the CO<sub>2</sub> monitoring plans for the project. Construction is currently underway and it is expected to be operational in early 2017. The project is being managed and funded by the National Energy Technology Laboratory of the USA's Department of Energy.

### ➤ **Understanding Renewable Energy Online Course**

Karen Surridge-Talbot, a regular contributor to AshFlashes has forwarded the following notice:

Energy21 is excited to partner with #YALIGoesGreen and we are proud to announce that the new YALI Network Online Course, Understanding Renewable Energy, is now available online at:  
[https://yali.state.gov/courses/energy/?utm\\_source=campaigns&utm\\_medium=southafricaclimate&utm\\_campaign=recourselaunch-emaillistserve#/?\\_k=5lpwzd](https://yali.state.gov/courses/energy/?utm_source=campaigns&utm_medium=southafricaclimate&utm_campaign=recourselaunch-emaillistserve#/?_k=5lpwzd)

The course examines how renewable energy functions and the benefits of using renewable energy as a main energy source. The course also explores the steps that you, as an energy consumer, can do to help reduce your energy demand. Once you complete the three lessons and pass the quiz, you'll receive an online certificate that you can share with your friends and family to show your commitment to renewable energy!

### ➤ **Laying the foundations for a green industry**

Australian university researchers have developed a strong, lightweight building material that they believe could generate a thriving new "green" industry for countries throughout the world. Dr Obada Kayali and Mr Karl Shaw of the University of New South Wales' Australian Defence Force Academy (UNSW@ADFA) have developed bricks and building aggregate that can be manufactured entirely from fly ash.

They say their unique manufacturing method traps any harmful chemicals, creating an eco-friendly construction material that saves on construction costs and reduces generation of greenhouse gases. Flash Bricks are 28% lighter and 24% stronger than comparable clay bricks while the aggregate, Flashag, can be used to make concrete that is 22% lighter and 20% stronger than standard products. This results in lighter structures, shallower foundations, cheaper transportation and less usage of cement and steel reinforcement.

"Fly ash coming from the power station can be fed straight into the brick manufacturing process," says Dr Kayali. "In China it is difficult to find clay or aggregate quarries close to a city. Many brick plants are idle due to lack of clay yet most power stations have some form of brick plant close by."

"There is growing interest in the country in reducing greenhouse gases, reducing chemical pollutants and dust emissions and stopping the alienation of the land. Flash Bricks and Flashag overcame many of these problems. Neil Simpson of NewSouth Innovations (NSi), the university's commercialisation arm, says the products have won widespread praise from structural engineers.

"Because Flashag results in lightweight, yet sturdy concrete, it can be used effectively in high-rises where smaller structural columns are needed to maximise floor space and in concrete bridges requiring longer spans."

The technology has two patents and licenses have been issued for the UK and US markets and are seeking interest from companies wanting to develop the technology for China, Japan, Southeast Asia, Europe and India.

#### ➤ **International Conferences**

- ***Ash Trade Europe 2017, Tallinn, Estonia, 6-7 April 2017***

The 9th in the global series, AshTrade Europe 2017 is expected to attract participants from Europe and beyond, who will focus on the business, logistics, technical challenges and opportunities in the coal combustion by-products sector. The event has specifically scheduled networking opportunities.

AshTrade Europe 2017 expands the scope to include new bio-based ash resources and their relevance for multiple applications in road construction and agriculture. The conference will also include slags and their co-utilisation with ashes.

It will focus on the market strategy for fly ash, regulations, transport costs, technical challenges and opportunities as well as innovation and environmental efforts.  
<http://www.gmiforum.com/ashtrade?view=event&id=54&catid=9>

- ***World of Coal Ash 2017 (WOCA), 8 - 11 May 2017, Lexington, Kentucky, USA***

WOCA is an international conference organised by the American Coal Ash Association (ACAA) and the University of Kentucky, Center for Applied Energy Research (CAER). This premier event addresses the science, research, applications and sustainability of coal ash utilisation. A wide-range of coal combustion products as well as gasification residues will be discussed.

<https://www.google.co.za/webhp?sourceid=chrome-instant&ion=1&espv=2&ie=UTF-8#q=Woca+2017>

- ***Coal Ash Asia, 21 - 24 July 2017, Baotou, Inner Mongolia***

Topics will focus on high-value utilisation, geopolymers, aluminium extraction, scrubber materials, cement and concrete.

<http://www.asiancoalash.org/>