



## Track 1: Industry Trends & Applications

### 9:20 AM - Plenary Presentations - Fulfilling Market Requirements by Enabling a Clean, Electrified and Efficient Future

Advanced ceramics are a [key material](#) in the transition to a cleaner, electrified and more efficient future. A plethora of technological advancements are being enabled by the disruptive potential of these materials. The latest in solar power harvesting, solid state batteries and energy storage, emission control, efficient sensors and the miniaturisation of electronics are all innovations that utilise advanced ceramic components.

To set the tone of this year's conference and its brand new theme the plenary session will examine the latest trends and challenges facing the ceramics supply chain and how as an industry we can best prepare for the transition to greener technology. Our industry leaders will discuss strategy and give their insights into accelerating this process.

Points to be discussed:

- Opportunities do advanced ceramic materials provide as a disruptive technology for environmentally friendly applications
- Changes in market requirements over the next five years and how this can benefit and challenge the advanced ceramics industry
- How E-Mobility can best contend with fossil fuels in today's technological climate

#### Speakers

**Steve Pawlowski**, Director Automotive Strategy, CoorsTek Inc.

**Mike Pilliod**, Director, Innovation Manufacturing, Tesla Motors Inc.

### 10:30 AM - Morning Break

### 10:45 AM - Panel Discussion - Solving Thermal Management Challenges for Electronic Packaging and Assembly Applications Using Advanced Ceramic Materials

Electronic circuitry is an exciting growth area for the technical ceramics industry though there are challenges in expanding their production. However, many electronic manufacturers are unaware of the benefits that ceramics can have for the industry. This session will explain the benefits of utilising ceramic materials for end users and manufacturers who cannot afford to miss this disruptive growth area.

For the supply chain, this session will also explore how to maximise their usage in electronic circuitry. It will also allow electronic packaging manufacturers who are already using ceramics in their products to outline the benefits for those who have not yet begun integration.

Points to be discussed:

- How can the production capacity of ceramic components be increased whilst also reducing production time?
- What is the biggest challenge in maximising ceramic adaptability? How can the materials become more versatile to meet the needs of niche applications?
- What are the benefits of utilising ceramic materials in electronic components?

## Speakers

**Mark DiPerri**, Business Development Manager, Toshiba America

## 12:00 PM - Lunch Break

## 1:00 PM - Panel Discussion: Understanding the Global Roadmap of Regulatory Updates for Emission Control Technology and its Implications for Catalytic Conversion Technology

Regulation on pollutants within the United States on a federal level has slowed in recent years however on a state level many are continuing to tighten regulation due to environmental concerns. Led by states such as California and Washington, the requirements for all industry sectors to control their emissions have continued to tighten. This session will explore the impact that these conflicting developments have had within the United States by keeping ceramic manufacturers and end-users up to date on how it may affect their business.

Despite complications within the United States there has been more international concern over emissions. Nations with existing or increasingly high levels of industrialisation are implementing stricter regulations in order to minimise harmful substances in the air. For those involved or looking to break into the manufacture and distribution of emission control technology on a global scale this session will provide the answers about what can be expected in the near future. In doing so the discussion will help the ceramics industry prepare for regulation change and take advantage in the new opportunities this provides globally.

Points to be discussed:

- How has the uncertainty surrounding of regulatory pressure with the US impacted the need for new developments in emission control technology?
- How do the divide between federal and state regulation impact emission control technology?
- What developments in regulation are we seeing on an international scale and what opportunities does that have on the technical ceramics industry?

## Speakers

**John Finley**, Founder, MEMPRO USA Ltd. & MEMPRO Ltd. (UK)

**Gordon Bartley**, CTO, Ecocat India

## 2:00 PM - Afternoon Break

## 2:15 PM - Presentations - Unlocking the Potential of Ceramics and Glass in Applications Varying from Consumer Electronic Displays to Solar Power

Ceramic glass provides a versatile and heat resistant material that is enabling numerous exciting applications. In the consumer electronics sector, ceramic glass is paving the way for flexible displays and the next generation of smartphones and tablets. For energy harvesting, ceramic glass provides a durable material which are used in solar panels and for heat dissipation in the movement of current. When it comes to energy storage, ceramic glass electrodes are what give solid state batteries their name.

With an emphasis on the energy harvesting and consumer electronics this session will provide insight into the key challenges which currently restrict the use of ceramic glass materials. These are cost of usage in large quantities, its durability in display applications and the issue of contamination and dirt build up. This session will allow our experts to address these challenges and offer their advice on how to overcome them.

Points to be discussed:

- Ceramic glass materials being utilised in energy storage and conversion for solar panel units
- Hardened ceramic glass used in electronic displays and the challenges of their implementation
- Dealing with the challenge of contamination and dirt build up in glass applications

### Speakers

**Michael Badding**, Sr. Research Associate, Corning R&D Corporation

**Jacob McLaughlin**, R&D Engineer, Honeywell

**Sheldon Jeter**, Associate Professor, Georgia Institute of Technology

## 4:30 PM - End of Day One - Join Us for the Welcome Reception in the Visitor Lounge

## Track 2: Materials & Manufacturing

### 9:20 AM - Programming Starts at 10:45AM

### 10:45 AM - Panel Discussion - Planning for the Future: Economic and Logistical Strategy to Help Maintain a Consistent Raw Material Supply

A natural or medical disaster and alterations to international relations can lead to supply shortages and leave companies without the materials they need to continue production. The continued supply of ceramic materials in a safe, ethical and cost effective manner is a key concern for the entire advanced ceramic supply chain.

This panel discussion will allow our experts to discuss how to plan and counter the uncertainty of the

global raw material supply chain. This will vary from a discussion of stock piling, increased production in new locations, conflict materials and laying out roadmaps for customers. Staying abreast of these challenges will help to ensure the continued expansion of companies from all areas of the supply chain.

Points to be discussed:

- How can the advanced ceramics industry address the continuing inflation of raw materials and uncertainty of their availability from an economic perspective?
- Is the stock piling of materials an effective way of combating economic uncertainty?
- Could the production of raw materials be expanded upon in the United States and Europe? Would this help to ensure supply?
- How can businesses of differing sizes lay out adequate roadmap plans for their clients?
- How are conflict rare materials impacting the ceramic supply chain?

### Speakers

**Gabriel Leis**, Senior Engineer & Executive Director, American Elements

**Mark Wolf**, Vice President, Fine Ceramics Group, Kyocera

### 12:00 PM - Lunch Break

### 1:00 PM - Presentations - Innovation Spotlight: Strides Forward in Machining and Process Improvement

This Innovation Spotlight is an opportunity for ceramic manufacturers and raw material suppliers to learn about improvements in the field of machining and processing. There is always room for innovation and for implementing new and exciting manufacturing methods. This can save time, cost and improve efficiency. Whether it be machining, sintering, de-binding, sorting or finishing, this is the session to find out what the competition are up to. With three expert speakers presenting on their cutting edge findings, this session is unmissable for manufacturers looking to improve their production processes.

Points to be discussed:

- Improvement of processing and sintering
- The cost efficiency of ceramic production methods
- The benefits of these changes to the end product

### Speakers

**Andrew Perry**, Group Ceramic Processes Leader, Lucideon

**Dhruba Panthi**, Assistant Professor, Kent State University

**Alban Bunjaku**, Business Unit Manager Ceramics, EIRICH

### 2:00 PM - Afternoon Break

## 2:15 PM - Presentations - Standardizing the Accuracy and Efficiency of Quality Analysis and Testing of Ceramics Materials

Ceramic materials can be challenging to replicate. The incongruities between components made using the same raw materials and equipment can be significant. The ability to accurately and consistently analyse ceramic materials at the various stages of its processing are key to countering and determining the origins of these inconsistencies.

There are numerous possible causes including the raw material supply, the processing equipment's viability and varying environmental factors based on the manufacturer's location. This session will address these challenges and see how they can best be countered.

Points to be discussed:

- What machining challenges do manufacturers want prioritised by their suppliers?
- How can consistency be fostered across the manufacturing process as a whole?
- How can the quality and testing analysis of ceramic materials be improved?

### Speakers

**Rick Passey**, SEM/DualBeam Product and Application Specialist, Thermo Fisher Scientific

**Nathan Henderson**, Senior Applications Scientist - XRD, Bruker

**Bill Walker**, Manager - Materials Engineering, Tenneco Powertrain

**Alex Van den Bossche**, Managing Director, GrindoSonic

## 3:30 PM - Presentations - Innovation Spotlight: Breakthroughs in the Field of Raw Materials and Powders

This Innovation Spotlight will explore advancements in the field of raw materials and powders and how new formulas, grain boundaries, materials can benefit the ceramics supply chain. Whether it be the improvement of an existing material or the use of a new formula, this session will help ceramic manufacturers and end users improve their understanding of what is available and how their products could evolve. Improvements to powders and raw materials could enable higher density, better quality, easier to produce products which would be highly beneficial to the entire supply chain.

Points to be discussed:

- Improvements to ceramic material properties such as thermal capacity and durability
- Overall quality of the ceramic product and the consequent new or improved applications
- Efficiency of the ceramic materials production and increase in yield

### Speakers

**Benoit Watremetz**, Industrial Process Manager, Fiven Norge AS

**Roland Bayer**, Application Development Leader, DowDuPont Speciality Products

**Guillaume De Calan**, CEO, Nanoe

## 4:30 PM - End of Day One - Join Us for the Welcome Reception in the Visitor Lounge

### Track 1: Industry Trends & Applications

#### 9:20 AM - Presentations - Engineering the Next Generation of Connectivity: The Latest Developments in 5G Connectivity and Sensory Technology

Sensory technology and piezoceramics are highly compatible given the ability of the ceramics to react minutely to stimulus without being destroyed in the process. Piezoceramics are already playing an important role in advancements in this field. With the necessity for sensory technology in applications such as autonomous vehicle guidance, 5G and telecommunications and emission control sensors it is vital that the ceramics supply chain are ready for the expansion of these markets. 5G for example is currently in development and requires sensors for its implementation. Our experts will explain how as an industry the ceramics supply chain can be ready for the advancements of infrastructure to make this a reality.

Points to be discussed:

- How can ceramic sensors play a role in the development of autonomous vehicles and what impact will this have on the transportation industry?
- What advantages do ceramic substrates have over their non-ceramic counterparts?
- What challenges do the ceramics industry face in meeting the requirements of the autonomous mobility market?
- How can 5G materials benefit from interaction with the world of advanced ceramics?

#### Speakers

**Shahram Shafi**, RF/mmW/Microwave Systems Engineer/Principal Manager, Ortenga

#### 10:30 AM - Morning Break

#### 10:45 AM - Presentations - Powering a Mobile Future: The Role of Ceramics in Taking Solid State Batteries from Theory to Practice and Improving Lithium Ion Models

Though solid state batteries are only just beginning to take hold in the automotive industry they are far from being ready for mass production. What can help to speed up this process is investment from the wide range of end-user markets that it can impact such as medical, consumer electronics and aerospace.

This session will examine new prospective applications for solid state batteries and the benefits that accompany their integration such as improved safety standards and higher energy density. However, it will also examine the biggest challenges facing solid state battery manufacture which are cost, testing and material supply.

Points to be discussed:

- What are the key challenges in the testing, characterisation and development of advanced ceramics and glass in solid state batteries?
- What improvements can be made to the energy density of lithium ion batteries using ceramic materials?
- How can ceramic components deal with the challenge of thermal management in batteries?
- How can the fragility of ceramic or glass cathodes be effectively countered?

### Moderator

**Michael Badding**, Sr. Research Associate, Corning R&D Corporation

### Speakers

**Mark Lefebvre PhD**, Senior Manager Open Innovation, Samsung SDI

**Daniel Abraham PhD**, Senior Scientist, Argonne National Laboratory

**Alevtina (Alla) Smirnova**, Associate Professor, SDSMT

**Asma Sharafi**, Research Engineer, Ford Motor Company

### 12:00 PM - Lunch Break

### 1:00 PM - Presentations - Ironing out the Wrinkles: Addressing the Challenges of Integrating Ceramic Matrix Composites (CMCs)

The last five years has seen the expanded usage of Ceramic Matrix Composites (CMCs). The benefits of these hybrid materials over their inferior metal counterparts have undeniable benefits when it comes to thermal management, strength and efficiency. Yet, there are still many challenges to be resolved before they can be applied to other applications.

We are already seeing CMCs utilised in the aviation and they are expanding to energy harvesting applications also. This session will explore the challenges of CMC manufacturing and explore some of the latest applications for these unique materials.

Points to be discussed:

- How can CMCs be effectively fastened in place of its metal predecessor?
- How can the unpredictability of ceramic fibre matrix interactions be reduced?
- In what ways can the challenge of stringent, time consuming testing methods required by aerospace applications be improved?

### Speakers

**Richard White**, Principal Consultant – Materials, Lucideon

### 2:30 PM - NASA - Special Project

Material development is a key focus area for NASA and given the importance of heat resistance and durability for aerospace applications this is no surprise. NASA's special project is a session dedicated solely to the advancements and requirements of the space agency in the world of advanced ceramics. NASA are heavily involved in the production of Ceramic Matrix Composites (CMCs), a range of

advanced coatings for corrosion and heat resistance and in energy harvesting and storage. This session will be an exciting and informative look at the agency's current projects, but you will have to attend to find out exactly what will be discussed.

Points to be discussed:

- NASA's material requirements for advanced applications
- The latest technological developments in the field of aerospace
- A discussion of the importance of advanced ceramics for future development

### Speakers

**James Fesmire**, Senior Principal Investigator, NASA Kennedy Space Center

**Valerie Wiesner**, Research Materials Engineer, NASA Langley Research Center

**Amjad Almansour**, Materials Research Engineer, NASA Glenn Research Center

**3:30 PM - End of Day Two**

## Track 2: Materials & Manufacturing

### 9:20 AM - Presentations: Understanding the Current Challenges of Integrating Additive Manufacturing into Technical Ceramics Production

Additive manufacturing is of keen interest to the supply chains of both advanced and monolithic ceramics. As a manufacturing method it offers a wealth of opportunity regarding the creation of complex and otherwise difficult to produce ceramic components. One of the biggest challenges for ceramic manufacturers is producing intricate components especially for the miniaturisation of electronics. Additive manufacturing offers the potential for overcoming this challenge due to its precision.

There are, however, challenges that must be overcome for additive manufacturing to reach its full potential. Ceramics are highly specialized materials which must meet the standards of their environment, additive manufactured ceramics need to reach the standards of density and quality set by the end user. Our experts will explore what the requirements are from an end user perspective and the challenges of standardising additive manufactured ceramics.

Points to be discussed:

- What are the key production challenges that additive manufacturing could help or are helping to overcome?
- Can additive manufacturing reach the required standards of materials for the advanced ceramic industry?
- What progress has been made in the field of material characterisation and testing standardisation of additive manufactured advanced ceramics?

### Speakers

**Holly Shulman**, Professor Ceramic Engineering, Alfred University

**Dr. Mohsen Seifi**, Director, Global Additive Manufacturing Programs, ASTM International

**Jason Jones**, Global Materials & Process Engineer, Moog

**Dror Danai**, CBO, XJet

## **10:00 AM - Panel Discussion: Further Integrating Additive Manufacturing into the Production of Technical Ceramics**

Following on from our presentations which outlined the challenges of integrating additive manufacturing into the advanced and monolithic ceramics industries this panel discussion will address how best to overcome them. Our experts have now outlined these challenges such as quality control and reaching the correct and consistent density for ceramic products. The purpose of this discussion is to inform ceramic manufacturers and end users of the next steps that can be taken to implement additive manufacturing into their businesses.

Points to be discussed:

- What are the end user requirements for ceramic additive manufacturing?
- How can the additive manufacturing sintering process be improved?
- How can the standardisation of ceramic additive manufacturing testing and material characterisation help to bolster its usage within the industry?

### **Speakers**

**Holly Shulman**, Professor Ceramic Engineering, Alfred University

**Dr. Mohsen Seifi**, Director, Global Additive Manufacturing Programs, ASTM International

**Jason Jones**, Global Materials & Process Engineer, Moog

**Dror Danai**, CBO, XJet

## **10:30 AM - Morning Break**

## **10:45 AM - Presentations - Achieving Commercialization: From Interpreting Noisy Data to Material Characterization**

The range of new and innovative applications for ceramics are tantalizingly close but taking a product from the theoretical stage to mass production can be challenging. The first hurdle to overcome is the interpretation of noisy data produced when a new material is analysed. The vast amount of raw data generated from this analysis can be daunting as it is not immediately obvious what can be done with it. Our experts will discuss how this data can be extrapolated and interpreted in order to lead onto the next stage of the commercialization process which is material characterization.

The process of characterising new ceramic materials is integral to their implementation in a real world application. It can also prove to be challenging given the diverse range of factors that can vary regarding a ceramic material. Especially challenging are ceramic materials that must adhere to strict strength and thermal management criteria as they must be tested extensively to assure that they will not fail and cause injury. This session will explore how manufacturers and end-users alike can best

determine these factors in a timely manner.

Points to be discussed:

- How can ceramic manufacturers best utilise the huge quantity of data available to them regarding their existing product?
- How can quality analysis of surface area of the ceramic particles be improved? How can cracks and imperfections be identified and minimised?

### Speakers

**Denny Mathew Alex**, Research Assistant, Otto von Guericke University

**Naveen Mani Tripathi**, Particle Scientist, Granu Tools

**Herbert Mucha**, Application Scientist, NETZSCH Gerätebau

### 12:00 PM - Lunch Break

### 1:00 PM - Presentations: Actualizing Commercialization: From Material Characterization to Mass Production

The commercialization of advanced ceramic materials has always proven to be a challenge no matter the application. Whether it be cost related, through the limitations of raw material availability, complications in the production process or merely the amount of time taken to produce and test a product, mass producing ceramics is a challenge as old as the industry itself. Overcoming this has the potential to enable advanced ceramics as a disruptive technology.

The previous session dealt with the interpretation of busy data and touched upon material characterization in its preliminary form. This session will continue to address material characterization but will deal mainly with the process of taking a material into mass production once it has been correctly understood and analysed.

Points to be discussed:

- How can the volume control of ceramic production be surpassed? What is stopping the mass production of inherently useful components?
- How can the consistency and density of a new material become uniform enough for production?
- What new technological innovations could help to streamline manufacturing processes?

### Speakers

**Mano Manoharan**, Chief Technologist, Ceramic Composites and Coatings, General Electric Aviation

**Rudolph Olson III**, Production and Technical Manager, CFOAM LLC

**Landon Mertz**, CEO, Cerion Nanomaterials

### 2:30 PM - Content on Track One

## 3:30 PM - End of Day Two

*Smarter Shows reserves the right to amend speakers, topics and scheduling at any time. This document is updated regularly to reflect such changes.*