



# The Charles Hatchett Award Seminar 2019

Battery Technology Trends and Innovation in  
Power Tools, Robotics and Cordless Devices:  
Opportunities for Niobium

[www.charles-hatchett.com](http://www.charles-hatchett.com)



# The Charles Hatchett Award

Niobium, element 41 in the periodic table, is a transition metal which is an important component in a wide range of materials. Its main use is as a microalloying addition in high strength steels for applications such as bridges, pipelines and car bodies. Niobium oxides are playing an emerging role in the development of new and advanced functionalised materials for applications in energy storage.

To recognise and celebrate the importance of niobium and its contribution to civilisation, the world's leading niobium producer Companhia Brasileira de Metalurgia e Mineração (CBMM) has initiated and sponsored the Charles Hatchett Award since 1979.

This accolade, named after the discoverer of niobium Charles Hatchett FRS, is awarded annually in association with the Institute of Materials, Minerals and Mining (IOM3) for the best paper in the general area of the science production and application of niobium-based materials. The award process is administered by Beta Technology.

Each named author of the winning paper receives an engraved medal, made from a slice of pure niobium, which features a portrait of Charles Hatchett.

For the 2019 Charles Hatchett Award, over 1000 papers, published in major journals and conference proceedings during the two-year period 1st September 2016 to 31st August 2018, were reviewed. A shortlist of five papers was assessed by the International Panel of experts resulting in the selection of the winning paper for 2019.



## International Panel

The International Panel is a group of six to nine international experts selected from around the world to provide an impartial assessment on the technical merit of the shortlisted papers.

Each International Panel member serves for a maximum of three consecutive years, but can be selected to serve another, non-consecutive period. The Chair is appointed by CBMM and is not governed by the three-year rule.

Since the inception of the Charles Hatchett Award, 87 eminent metallurgists have served on the panel and several of our panel members are themselves past award winners.

## Current Panellists



**Dr Mike Hicks**

Chair of the International Panel | UK



**Dr Wilian Labiapari**

Aperam Research Center | Brazil



**Professor Delia Milliron**

The University of Texas | USA



**Dr Alec Mitchell**

University of British Columbia | Canada



**Dr David Porter**

University of Oulu | Finland



**Dr Nuria Sanchez**

ArcelorMittal Global R&D | Belgium



**Dr Jun Takahashi**

Nippon Steel & Sumitomo Metal Corporation | Japan



# Charles Hatchett Award 2019 Winning Paper

## Niobium Tungsten Oxides for High-rate Lithium-ion Energy Storage

Nature, 559 (2018), 556-563

There is a need to develop new electrode materials for batteries which will improve both charge/discharge rates and increase storage capacities. This is important for growing markets such as electric vehicles and large-scale energy storage.

This award-winning research presents some initial data on two complex niobium-tungsten oxides which are claimed to show greater energy and power densities than those in battery materials currently available.

The Charles Hatchett Award selection process is concerned with technical excellence and originality, but also takes account of the social, economic and environmental advantages of any proposed application of niobium.



The International Panel for the Charles Hatchett Award commented,

“This paper deals with a very important research topic with potential commercial applications involving the use of niobium: how to significantly increase the capacity and reduce the charging time of Li-ion batteries. The research used a wide range of experimental methods, producing extensive data. The potential applications of the technology could have clear sustainability-related impacts by promoting the use of non-carbon energy storage and usage.”

The award winners will be presented with their medals at the Institute of Materials, Minerals and Mining (IOM3) 2019 Premier Awards Dinner, to be held in London on 11th July.

## 2019 Charles Hatchett Award Winners

Kent J. Griffith  
University of Cambridge | UK

Clare P. Grey  
University of Cambridge | UK

Giannantonio Cibilin  
Harwell Science and Innovation Campus,  
Didcot | UK

Lauren E. Marbella  
Columbia University, NY | USA

Kamila M. Wiaderek  
Argonne National Laboratory, Argonne IL | USA



A copy of the paper is available at: <https://www.nature.com/articles/s41586-018-0347-0>



## The Charles Hatchett website provides further information on:

### The Award

The history of the Charles Hatchett Award, the application criteria and selection process, including details of current and past international panellists.

### Award Winners

A comprehensive list of all previous winners since the first award in 1979.

### Resource Library

Access to winning papers, video presentations from the winning authors and highlights from previous seminars.

### Charles Hatchett

Who was Charles Hatchett, when did he discover niobium and why is it also referred to as Columbium?

### Niobium

Videos about the wide range of niobium applications and technical presentations.





# Award Sponsor

## Companhia Brasileira de Metalurgia e Mineração (CBMM)

CBMM is the world's leading supplier of niobium and niobium technology.

Fully integrated from the mine to the final customised products, CBMM also provides expert technical support to customers in the most sophisticated steel and technological segments around the globe.

Headquartered in Brazil, CBMM has a technology subsidiary in Switzerland, commercial subsidiaries in Europe, Asia and North America, and an extensive worldwide network of strategically positioned supply warehouses.

### The World's Leading Niobium Producer

CBMM was founded in 1955 in Araxá, Minas Gerais, Brazil, the site of a large niobium ore deposit. Decades of investment in niobium technology, niobium applications and customer service have earned CBMM the position of the world's leading niobium producer and the sole company present in all niobium market segments.

The company's team of over 1,800 highly trained, dedicated professionals is committed to providing cutting-edge niobium products to over 300 customers in 50 countries around the globe.

### A Sustainable Enterprise

A commitment to the environment, employees and the community that dates back to CBMM's earliest days has solidified the company's reputation as a sustainable enterprise. In addition to numerous certifications and honours, including being the first mining and metallurgy company in the world to earn ISO 14001 certification, CBMM's mission is sustainable:

**Expand the use of niobium technology, transforming a natural resource into solutions to build a better world.**





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## Battery Technology Trends and Innovation in Power Tools, Robotics and Cordless Devices: Opportunities for Niobium

Beech Suite, Royal Lancaster Hotel, London  
11th July 2019

### Agenda

09.00	Registration	
09.30	Welcome and Introduction	Ricardo Lima, CBMM
09.35	Current Status and Future Trends for the Lithium-ion Battery Market – Focus on Power Tools, Robotics and Cordless Devices	Christophe Pillot, AVICENNE ENERGY
09.55	Technology Challenges and Opportunities for Fast Charging and Durable Batteries	Professor Emma Kendrick, University of Birmingham (Chair)
10.10	The Charles Hatchett Award 2019 Lecture “Niobium Tungsten Oxides for High-rate Lithium-ion Energy Storage”	Kent Griffith, Northwestern University
10.50	Coffee	
11.20	Fast Charging Technologies and Related ABB Storage Solutions	Dr Lorenz Herrmann, ABB
11.50	An Innovative Solution for the Robotic Warehouse Concept	David Grant, Battery Streak
12.20	Fast Charging as Enhancing Technology for New Generations of Power Tools	Dr William Rigdon, Stanley Black & Decker
12.50	Discussion and Concluding Remarks	João Oliveira, CBMM
13.00	Lunch and Networking	