

## 第 123 回メカニカルシステムセミナー

第 99 回エネルギー超高度利用研究拠点セミナー

### Metal Energy Carriers: Renewable fuels for the future

日 時	2022 年 4 月 28 日 (木) 18:00-20:00 (日本標準時)
場 所	オンライン (Online)
URL	<a href="https://teams.microsoft.com/join/19%3ameeting_YzEyZWU2MTUtZWZmYS00Yzg4LWE5NDktMDIjYWI1MmQ3OGZI%40thread.v2/0?context=%7b%22Tid%22%3a%22c40454dd-b263-4926-868d-8e12640d3750%22%2c%22Oid%22%3a%22dc8cf9db-f51b-4caf-b942-f42fb14cdf23%22%7d">https://teams.microsoft.com/join/19%3ameeting_YzEyZWU2MTUtZWZmYS00Yzg4LWE5NDktMDIjYWI1MmQ3OGZI%40thread.v2/0?context=%7b%22Tid%22%3a%22c40454dd-b263-4926-868d-8e12640d3750%22%2c%22Oid%22%3a%22dc8cf9db-f51b-4caf-b942-f42fb14cdf23%22%7d</a>
講 演 者	Prof. Philip de Goey, Eindhoven University of Technology, Netherlands

**L.P.H. de Goey** is professor of combustion technology and dean of the Department of Mechanical Engineering at Eindhoven University of Technology, secretary of the Combustion Institute Executive Committee and chair of the board of the Metalot Innovation Center. He received his Ph.D. at the Department of Physics of the same university. He was co-editor of the Proceedings of the Combustion Institute and co-authored over 400 scientific publications. In 2010 he was received the 'Simon Stevin Meester' Award, this is the highest Dutch award in the area of technical sciences, in 2018 he became fellow of the CI and in 2020 he was appointed member of the EU academy of sciences and received a prestigious ERC advanced grant on metal fuel combustion.



講演タイトル	Metal Energy Carriers : Renewable fuels for the future
講演概要	次ページの Abstract をご参照下さい。
申込方法	次のリンクにご記入下さい。 <a href="https://forms.gle/xPbU61QHo9Bd3hD8A">https://forms.gle/xPbU61QHo9Bd3hD8A</a>
参加費	無料

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## Abstract

Metal powder has superior energy density compared to fossil fuels and hydrogen. Therefore, metal powders have gained interest as a material for energy storage. The main benefits of metal fuels are that they do not produce CO<sub>2</sub> emissions during combustion, they have the potential to be retrofitted in existing coal power plants and they can fit into the existing fuel transportation infrastructure. Furthermore, this enables the production of sustainable energy since metal fuels can be regenerated from metal oxides, using hydrogen from renewable sources. In this presentation, the main characteristics of metal fuels are presented with a final focus on clean combustion. A series of burners has been developed:

- single particle or fuel jet in a micro burner to study single particle combustion and particle-particle interaction
- Bunsen-type burner for stabilizing laminar and weakly turbulent premixed flames
- Tornado-swirl burner

First numerical studies are also started for comparison.

Furthermore, a 100 KW demonstrator set-up is developed to demonstrate clean combustion to produce steam (placed at Swinkels brewery and Metalot centre). Studies to scale up are also conducted. The main objective of this practical systems is the development of an integrated flexible metal fuel burner with a capacity of 100 KW (TRL5). This is an essential step towards implementation of this sustainable technology. This project forms the basis to further develop full scale burners with a capacity of 10 MWth. The development of the prototype burner is executed by a consortium which covers the entire supply chain. This includes the production of metal powder, fuel preparation, burner and combusted product handling. The industrial partners have broad experience in metal powder supply, dense energy carriers and operating coal fired power plants. Furthermore, techno-economic analyses and the assessment of retrofit potential to existing assets will be carried out. Status-quo will be presented.

