



# 6<sup>th</sup> IEEE International Conference on Sustainable Energy and Future Electric Transportation (IEEE SeFet 2026)

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## 6<sup>th</sup> IEEE SeFet 2026 Special Session

### SS2: Advancements in Power Converters for Hydrogen-Based Hybrid Microgrid Systems

#### About the Special Session:

Hydrogen is rapidly emerging as a promising clean energy carrier with the potential to significantly reduce carbon emissions across major sectors, including power generation, transportation, and industrial applications. As countries accelerate the transition toward renewable-dominated energy infrastructures, hydrogen offers a strategic pathway to address the intermittency and variability of solar, wind and other renewable sources enhancing system flexibility, improving resilience, and enabling large-scale decarbonization. Its combination with renewable sources in hybrid microgrids (HMGs) offers exceptional opportunities for long-duration storage, peak-shaving, and backup supply. Meanwhile, the rise of hydrogen-powered fuel cell electric vehicles (EV) further accentuates the need for efficient power conversion systems. Evidently the core of hydrogen-enabled systems lies the need for advanced power electronic converters and intelligent control architectures. Seamless integration of fuel cells, energy storage, and electric vehicle charging infrastructure requires bidirectional and high-efficiency power conversion. In particular, high-gain DC–DC converters, both isolated and non-isolated, multi-port converters, bidirectional AC–DC converters are essential in hydrogen-based hybrid microgrids and EV charging systems. These converters must ensure high conversion ratios, reduced losses, electrical isolation where needed, and compliance with stringent power quality standards. Additionally, robust control play crucial roles in improving energy management, minimizing reactive power across linear and nonlinear loads, and ensuring dynamic stability under varying operating conditions.

#### Topics of interest are:

- ✓ High-gain DC–DC converter topologies for hydrogen based systems
- ✓ Isolated converters using HF transformers
- ✓ Non-isolated high step-up converters with ultra-wide conversion ratio
- ✓ Bidirectional power converters for hydrogen hybrid energy storage
- ✓ Converter-based fast charging solutions for FCEVs and hybrid EVs
- ✓ Multiport converters for renewable-hydrogen-EV power management
- ✓ Advanced control schemes: predictive, adaptive, data-driven & AI-based
- ✓ Harmonics mitigation and power quality enhancement in hybrid microgrid systems
- ✓ Digital twin and real-time monitoring of hydrogen conversion systems
- ✓ Reliability, and protection in converter-driven hybrid microgrid systems



**Dr. Kaibalya Prasad Panda**

Assistant Professor,  
Department of EE, SoET,  
Pandit Deendayal Energy University,  
Gandhinagar, Gujarat, India, 382007  
[kaibalyapanda.nit@gmail.com](mailto:kaibalyapanda.nit@gmail.com)



**Dr. Preeti Sharma**

Assistant Professor,  
Department of EE, SoET,  
Pandit Deendayal Energy University,  
Gandhinagar, Gujarat, India, 382007  
[preetisharma3782@gmail.com](mailto:preetisharma3782@gmail.com)



**Dr. Pratikanta Mishra**

Assistant Professor,  
Department of Electrical Engineering,  
National Institute of Technology  
Meghalaya, Cherrapunji, Meghalaya,  
793108  
[pratikanta.mishra@nitm.ac.in](mailto:pratikanta.mishra@nitm.ac.in)

**Paper Submission Deadline: 31/01/2026**

**Please ensure you select track the Special Session SS2: Advancements in Power Converters for Hydrogen-Based Hybrid Microgrid Systems, while submission!**

Submission Link: <https://cmt3.research.microsoft.com/SEFET2026/Submission/Index>

Conference Website: <https://vnit.ac.in/sefet26/index.html>

**All presented papers will be considered for further review and publication in IEEE Transactions on Industry Applications and IEEE Industry Applications Magazine.**