

GR-23-01-Novel Electric Insulators and Partial Discharge Detection Techniques for Resilient Medium Voltage Distribution Systems

1. Company or University Name, as well as partnering organizations

University of Wisconsin Milwaukee

2. Project Title

GR-23-01-Novel Electric Insulators and Partial Discharge Detection Techniques for Resilient Medium Voltage Distribution Systems

3. Project PI/Contact

Dr. Chanyeop Park

4. Technology Roadmap Target Area

1. Power Devices and Modules
2. Power Electronics Systems
3. Power Electronics Reliability
4. Protection and Management

5. Project Summary

Introduce new materials and techniques that can be used to mitigate partial discharge in medium voltage power electronics modules.

6. Technology Gap/Market Need

The previous techniques used to mitigate partial discharges in power modules could not address issues such as working with high rate of change of voltage and higher temperatures which are solvable by our approaches.

8. Target Application (where does it fit in?)

Power Packaging

Circuits and Converters

8. Accomplishments/Deliverables

We were able to mitigate partial discharge by introducing inorganic material thin film coating as Silicon Dioxide and Silicon Nitride ($\text{SiO}_2/\text{Si}_3\text{N}_4$).

10. Impact/Benefits

The project effectively mitigates partial discharge in medium voltage power electronics modules. It also fills a critical technology gap by providing solutions that were previously not available in mitigating partial discharge in power modules. By addressing this gap and meeting market needs for more resilient and reliable power electronics systems, the project offers significant value to GRAPES industry members, enabling them to deploy advanced technologies that enhance the efficiency and stability of the electric power grid.

11. Image

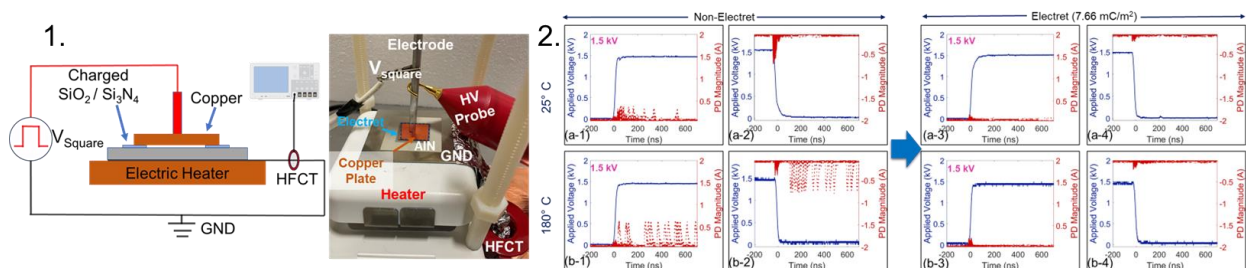


Fig: 1) Test Setup for partial discharge (PD) measurement and 2) PD mitigation results, by thin film inorganic electret in elevated temperature