THIN-FILM OPTICAL VOLTAGE SENSOR FOR VOLTAGE SENSING

Tech ID: 32379 / UC Case 2021-164-0

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Published Application	20230080274	03/16/2023	2021-164

BRIEF DESCRIPTION

Researchers at UC Berkeley have developed techniques for optical voltage sensing of power grids as well voltage sensing within a human or animal subject.

The safe, accurate and economical measurement of time-varying voltages in electric power systems poses a significant challenge. Current systems for measuring power grid voltages typically involve instrument transformers. Although these systems are accurate and robust to environmental conditions, they are bulky, heavy, and expensive, thus limiting their use in microgrids and sensing applications. An additional drawback is that some designs explode when they fail. Optical methods for direct measurement of high voltages have gained attention in recent years, mainly due to the high available bandwidth, intrinsic electrical isolation, and the potential for low cost and remote monitoring.

Stage of Research

The inventors have developed a low-Q resonant optical cavity-based voltage sensor based on a piezoelectric AIN thin film that transduces a voltage applied across the piezo terminals into a change in the resonant frequency of the cavity. This sensor can be fabricated with high yield and low cost (<$1), which makes it uniquely well-suited to reduce the cost of grid voltage measurement.

SUGGESTED USES

- Measuring power grid level voltages (e.g. tens to hundred of KV) over a large range of environmental conditions (including temperature, humidity, etc.).
- Measuring voltages within a subject (including human or animal subjects).
- Measuring light either reflected by a medium, or transmitted by a medium.

ADVANTAGES

The sensor described here can be fabricated with high yield and low cost (<$1), which makes it uniquely well-suited to reduce the cost of grid voltage measurement.

RELATED MATERIALS

- J. L. Edmunds, S. Sonmezoglu, J. Martens, A. von Meier, M. Maharbiz, and J. Edmunds, "Optical voltage sensor based on a piezoelectric thin film for grid applications," Optics Express, vol. 29, no. 21, pp. 33716--33727, Aug. 2021.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Systems For Pulse-Mode Interrogation Of Wireless Backscatter Communication Nodes
- Woven Fabric Bioelectronic Device

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Voltage, sensor, Optical, Piezoelectric

CATEGORIZED AS

- **Optics and Photonics**
  - All Optics and Photonics
- **Energy**
  - Other
  - Transmission
- **Engineering**
  - Engineering
- **Sensors & Instrumentation**
  - Biosensors
  - Other

RELATED CASES

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