Abstract Submitted
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Sensing RF and microwave energy with fiber Bragg grating heating via soft ferromagnetic glass-coated microwires[1] M.H. PHAN, J. DEVKOTA, H. SRIKANTH, Department of Physics, University of South Florida, P. COLOSIMO, A. CHEN, Applied Physics Laboratory, University of Washington — The fiber Bragg grating (FBG) is the basis of numerous sensors. For the most part, strain and temperature are the primary environmental parameters that can be detected with FBGs. Other variables can be measured by using a probe design that converts the desired variable to a strain or temperature change. For example, an FBG bonded to the wall of a vacuum chamber might be used to measure pressure if the wall strain vs. pressure calibration were known. We present results from a new type of microwave energy sensor that relies on Joule heating of a soft ferromagnetic glass-coated microwire to change the temperature of an FBG. The microwire absorbs microwave energy and heats up thus raising the temperature of the FBG. Compared to a similar sensor that uses gold to absorb electromagnetic radiation, the microwire yields a sensor with greater sensitivity (10 times at f =3.25 GHz) relative to the perturbation of the microwave field. With this newly developed sensor, the best sensitivity to electromagnetic radiation corresponds to AC electric fields that have root mean square (RMS) amplitude of approximately 36 V/m. It is physically very small, can be deployed as a distributed sensor, and often only minimally perturbs the field being measured.

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Manh-Huong Phan
University of South Florida

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