

**ENERGY DENSITY ABOVE A RESONANT METAMATERIAL IN THE GHz:  
AN ALTERNATIVE TO NEAR-FIELD THERMAL EMISSION DETECTION**

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**ABSTRACT.** This paper proposes an experiment to easily detect radiative heat transfer in the microwave range. Following an idea given by Pendry more than a decade ago, we show that a 3D array of tungsten 2  $\mu\text{m}$  radius wires with a 1 cm period makes a low cost material exhibiting a surface plasmon in the microwave range around 2.9 GHz. Such a heated material should exhibit an emission peak near the plasmon frequency well above ambient emission. Analysis of the signal detected in the near-field should also be a tool to analyze how homogenization theory applies when the distance to the material is of the order of the metamaterial period. It could also be give a model to non-local dielectric properties in the same conditions.