

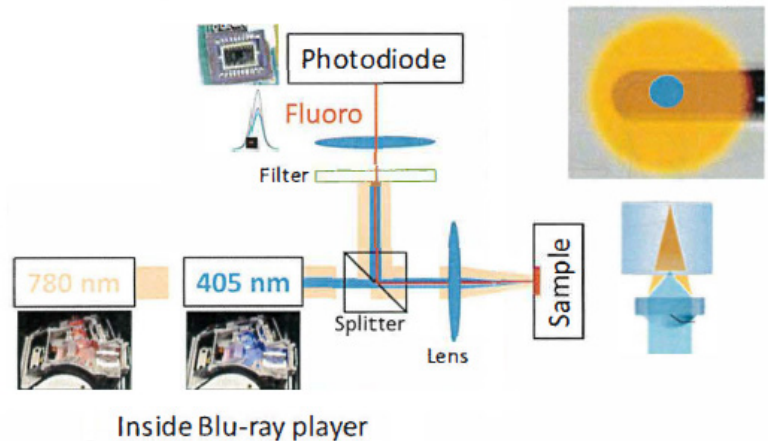


# HD DVD Based Fluorescent Scanning Thermal Microscope

BYU #2016-046

## BACKGROUND

Knowledge of the thermal behavior of nuclear fuels prior, during, and after operation in a reactor is essential for reactor performance and safety. The nuclear reactor environment is hostile and the radiation can have a damaging effect on expensive measurement equipment and electronics. Researchers at BYU developed an instrument that cheaply and non-destructively measures the material properties of a nuclear fuel pellet.



## PROBLEM SOLVED

Dr. Munro's invention uses a modified optical head of an HD DVD player to provide a fluorescent microscope that solves the problem of having a spatial map of the thermal property of a material - it provides a high spatial resolution (near 0.5  $\mu\text{m}$ ), with the ability to scan along the radial dimension. Standard techniques (hot wire, laser flash, guarded hot plate) for measuring the thermal conductivity cannot meet this requirement, and embedding sufficient thermocouples along the radial dimension would be impractical.

## KEY ADVANTAGES

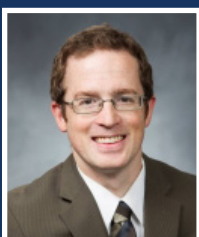
- » *Its significantly lower cost allows for inexpensive replacements to be made which is ideal for a harsh nuclear environment*
- » *It takes less sample preparation thus saving time*

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## APPLICATIONS

Nuclear fuel industry, thermal conductivity measurement instrument manufacturers, non-destructive testing industry, thermoelectric device manufacturers, biological laboratories and where thermal properties of solids would be needed.

**IP STATUS:**  
US Provisional Application  
62/428852



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