Healthy Homes Grantees in Region 1 – New England

**Name of Grantee:** Radiation Monitoring Devices, Inc.

**Name of Project:** A Portable Instrument to Detect, Identify, and Quantify Mold In Homes

**Amount Awarded:** $449,444

**Year of Grant:** 2001

**Contact Info:**
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**Project Partners:** Radiation Monitoring Devices, Inc., University of Virginian School of Medicine, U.S. Department of Agriculture’s Forest Products Laboratory

**Summary of Project Activities:**

There is a growing concern about the adverse health effects of mold on the occupants of damp buildings. Mold spores have been linked to pulmonary hemorrhage, as well as allergic and asthma reactions. These health effects are expected to be more severe in infants, children, and immuno-compromised individuals. Therefore, early detection of mold in homes and subsequent remediation is expected to improve the quality of the home environment and have a significant positive impact on health. This project will develop a compact bio-analysis instrument to detect, identify, and quantify the concentration of mold spores in homes. The portable instrument will collect a sample of room air and channel the mold spores through micro-fluidics to analysis chambers. The spore load will be analyzed using antibody reactions and ultra-sensitive optical detection techniques. The instrument will provide an on-site analysis capability, enabling spore concentrations to be mapped from room to room and providing a means to localize the mold infestation for quick remediation.

Several species of mold have been linked to adverse health effects. *Stachybotrys chartarum*, an Ascomycete, can cause serious indoor air quality (IAQ)-related illness and has been linked to pulmonary hemorrhaging in infants. Other species of Ascomycotina (i.e., mold fungi) create health concerns for individuals with allergies and asthma. Among them, *Penicillium*, *Aspergillus*, *Trichoderma*, and *Aureobasidium* grow readily in conditions of high humidity, are ubiquitous, and produce copious amounts of conidial spores. Causes of "sick building syndrome" often go unexplained because of the lack of sensitive instruments to evaluate the magnitude of spore load in specific areas of buildings, which are susceptible to fungal contamination. There is a need for low-cost analytical techniques for the on-sight determination of toxigenic bio-aerosols to identify and help remediate the sources of pulmonary disease and respiratory distress. One way to accomplish this is to design instrumentation utilizing antibodies, which specifically recognize fungal spores. The overall goal of this research is three-fold:

**Product Outcomes/Outputs:**

1. To demonstrate that one can reasonably estimate the magnitude of total spore load at specific locations within a building by subjecting collected bio-aerosols to an immunoassay using a series of polyclonal antibodies, which are raised against
heat killed conidia and soluble extracts from four mold cultures (*Penicillium sp.*, *Aspergillus niger*, *Trichoderma harzianum*, and *Aureobasidium pullulans*);

2. To build a library of monoclonal antibodies to purified spore coat antigens and demonstrate identification to species of a small number of IAQ-related mold fungi by fluorescence-linked immunosorbent assay;

3. To fabricate a low-cost, portable, biochip instrument which will utilize these polyclonal and monoclonal antibodies, combined with fluorescence and light scatter measurements to evaluate the magnitude of spore load in contaminated buildings and recognize a small range of

The research project is a collaborative venture involving the following organizations:

Radiation Monitoring Devices, Inc.
University of Virginian School of Medicine
U.S. Department of Agriculture’s Forest Products Laboratory