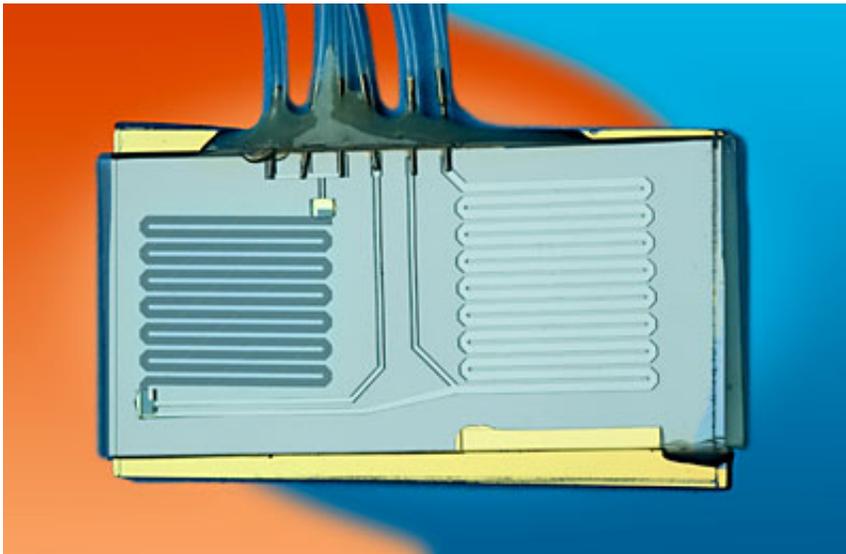


Portable device detects anthrax in under an hour

August 1 2011, By Krishna Ramanujan



This photograph shows the device's microfluidic chip, which measures approximately one centimeter by 3 centimeters and integrates sample purification and real-time PCR analysis chambers. Credit: Kent Loeffler, Cornell University

A portable device can detect the presence of the anthrax bacterium in about one hour from a sample containing as few as 40 microscopic spores, report Cornell and University of Albany researchers who invented it. The device could provide early detection in the case of an anthrax attack, saving many lives.

The basic design, which is small enough to fit in the overhead

compartment of an airplane, potentially could be tailored to detect countless other pathogens, such as salmonella, or be used in the field for DNA forensics.

"It was built with the notion of being portable," said Carl Batt, Liberty Hyde Bailey Professor in the Department of [Food Science](#) at Cornell and a co-author of the paper published in July in the *International Journal of Biomedical Nanoscience and Nanotechnology* (Vol. 2, No. 2). Nathaniel Cady, Ph.D. '06, a nanoscale engineer at the University of Albany, is the paper's lead author.

Seven years in the making, the detector requires that a sample be inserted into the device. From there the machine automatically recovers cells, collects and purifies DNA and then conducts real-time polymerase chain reactions (PCR) to identify if anthrax is present. PCR can amplify extremely small amounts of DNA and is a well-established platform for rapidly detecting [biological material](#).

The researchers began by acquiring what amounts to a small suitcase-sized plastic box with the notion that, "whatever we do, it has to fit in here. It was a line in the sand, an engineering challenge where everything had to fit in the box," Batt said.

The shape of a heavily reinforced suitcase, the device is complete with pumps, heating and cooling elements, and optical and computational circuitry.

By tailoring different assays to the portable real-time PCR platform, the device could be used for a variety of applications in addition to anthrax detection, such as at a crime scene for forensics. For example, if detectives were to find a sample they believe belongs to a [perpetrator](#), they might use such a device to rapidly and broadly determine the gender or eye color of the suspect.

The researchers are currently working to develop new strategies for pumping fluids in the device, a system that now occupies the majority of the space and most of the power. Novel pumping systems based on silicon processing are being created, which could allow engineers to fabricate most of the components of the system on a single chip.

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Provided by Cornell University

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