

*Streamlining Blood Testing***SAMUEL K. SIA**

Assistant Professor of  
Biomedical Engineering

**D**octors in developing countries will soon be able to use handheld devices to collect and analyze blood tests at a patient's bedside to diagnose infectious and other diseases, thanks to research by Samuel K. Sia, assistant professor of biomedical engineering at Columbia SEAS.

The devices, now undergoing field tests in Rwanda, require only a finger prick of blood and provide quantitative results in less than 20 minutes. The aim of the new technology is to significantly reduce the time between testing patients and treating them, without increasing costs or regulatory burdens.

“Nowhere is the need for new diagnostic technologies greater than in developing countries, where people suffer disproportionately from infectious disease compared to the U.S. and Europe,” says Sia.

The “lab-on-a-chip” technology uses microfluidics—the manipulation of small amounts of fluids—to miniaturize and automate routine laboratory tests onto a handheld microchip. The devices are being developed in a collaboration between Sia's lab and Claros Diagnostics Inc. – a venture capital-backed startup company that Sia co-founded in 2004 – as well as with the Mailman School of Public Health at Columbia University. Sia's work also focuses on developing new high-resolution tools to control the extracellular environments around cells, in order to study how they interact to form human tissues and organs. His lab uses techniques from a number of different fields, including biochemistry, molecular biology, microfabrication, microfluidics, materials chemistry, and cell and tissue biology.

Popular Science featured the mobile lab in a recent issue: “Most blood tests require shipping vials off to a lab, followed by several days of nail biting. This kit, one of the first that can diagnose multiple diseases on the spot, shrinks an entire lab into a two-piece portable package that even novices can use. A disposable, \$1 plastic card, formed through injection molding, holds miniature versions of test tubes and chemicals. In place of technicians or \$100,000 machines, a battery-powered, \$100 gadget mixes the molecules.”

In August, MIT's Technology Review magazine named Sia to its prestigious listing of the World's Top Young Innovators for 2010 for his groundbreaking work in biotechnology and medicine. He was selected from more than 300 nominees by a panel of expert judges and the editorial staff of Technology Review.

Sia received a CAREER Award from the National Science Foundation that supports his work in developing biocompatible microelectromechanical systems and implantable medical devices, such as glucose sensors.

A recipient of the Walter H. Coulter Early Career Award in 2008, Sia participated in the National Academy of Engineering's U.S. Frontiers of Engineering symposium for the nation's brightest young engineers in 2007.

*B.Sc., University of Alberta (Edmonton, Canada), 1997; Ph.D., Harvard, 2002*