The CNST News

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ACTA Technology Develops a Handheld Blood Meter in the NanoFab

Using a handheld measurement device whose components were built in the NanoFab, patients may one day test their own clotting time.

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Researchers from ACTA Technology, based in Boulder, CO, are developing a hand-held point-of-care and home use test for measuring blood coagulation that uses a drop of whole blood taken by a finger prick. Unlike clinical devices currently on the market, which use optical analysis, cantilevers, or chemical reactions, their approach uses microelectromechanical sensors which incorporate a parallel plate to measure the blood clotting time. Based on technology developed by Nicholas Dagalakis in the NIST Engineering Laboratory, the device tests a small amount of whole blood, making it less intrusive so it can be used at home or in a doctor's office, without the need for a laboratory.

The prothrombin time test works by introducing tissue factor to begin the series of reactions that occur when a blood vessel is ruptured. The clot changes the blood from a free-flowing solution to a gel-like substance and it is this change that the sensor monitors and detects.

Various medical conditions require the use of the anti-coagulant warfarin, a powerful but potentially dangerous drug. Affected patients need their clotting time monitored to ensure proper drug dosing. ACTA's device has been demonstrated to measure the rheometric properties of complex fluids similar to blood in seconds using nanoliter size samples.

Edward Clancy, ACTA's Chief Technical Officer, credits the CNST NanoFab staff for his company's ability to rapidly develop prototypes. "We built our entire sensor device in the NanoFab, everything from the mask writing to the ion etching to the deposition of our gold contacts," says Clancy, "Now that we have the processes optimized, we can go to a fabrication shop in the U.S. for mass production." According to Clancy, "a small company cannot do this ourselves, and it is hard to get commercial fabs to produce small quantities for prototyping."

Medicare recently announced expanded coverage for warfarin patients, including monitoring clotting time at home. Thirty million Americans take warfarin, a number that will grow as more people use blood thinners to reduce the risk of heart attacks and strokes. Clancy believes that ACTA is well positioned to see its product widely adapted as home blood testing becomes more common.

http://www.nist.gov/cnst/upload/CNST_News_Winter2012.pdf