

## **Affordable Healthcare in India**

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There is an increasing demand for accurate, efficient and cost-effective treatment methods and devices in healthcare. The main goal behind the research in Nanobios Lab at IIT Bombay relates to the development of biosensor assays and their integration into affordable Point-of-care diagnostic devices and use of nanoengineering techniques for affordable healthcare products.

Nanobios lab in collaboration with Biosense Technologies Pvt Ltd have already commercialized, uChek (<http://uchek.in>) - a low cost smartphone based urine dipstick reader which was designed, tested and deployed. uChek can interpret upto ten analytes in urine including glucose, bilirubin, ketones, proteins, urobilinogen, pH, SG, occult blood, leukocytes and nitrites. The accuracy of uChek was found to be comparable to commercially available semi-automated urinalysis instruments in laboratories with 100% of readings within +/- 1 color block.

Nanobios lab in collaboration with Biosense Technologies Pvt Ltd have also manufactured and commercialized " SuChek". Suchek is an indigenous, accurate, low-cost glucometer supported by the Indian Council of Medical Research. Suchek reagent strips are as accurate as conventional glucometers, at a fraction of the price. Along with the glucometer, the companion Suchek mobile application helps save, trend and analyze blood glucose levels at an individual level or track response to treatment at a community level.

Microneedles are being fabricated in the lab for delivery of vaccines and drugs. We believe effective care of the most hard-to-treat conditions requires approaches beyond simply taking medicine / applying patch. We are transforming how medicine is delivered and how people achieve their health goals through the convergence of optimized drug delivery, embedded sensor technology to monitor compliance, and connected and personalized behavioral support.

Another project involves the design of a heat triggered Transdermal drug delivery system (TDDS) using a thermoresponsive gel patch, where patients can themselves administer a pulse of drug on mere application of heat pad over the TDDS, whenever pain is experienced. We have also created novel drug loaded sponges for combating Surgical Site Infections (SSI). SSIs are best prevented by eradicating bacteria at the earliest stage, by deploying effective counter-measures locally so that bacteria does not propagate further and cause infection at the operated site. Finally, we have also developed bioresorbable bone screws of novel biomaterial composite materials with advanced functionality and improved design that are now moving to large animal trials.

We believe that these are small steps towards "Make in India and Made in India" and a lot more needs to be done to educate everyone of the importance of making affordable healthcare products in India.

## BIO

Dr. Rohit Srivastava is currently working as a Professor at the Indian Institute of Technology, Bombay. His specialization lies in POC Diagnostic devices, Biomedical Microsystems devices (MEMS), nanoengineered biosensors, photothermal therapy in cancers and nanoengineered orthopedic applications. Dr Srivastava in collaboration with Biosense Technologies Pvt Ltd has developed and commercialized "UChek" a portable urine analysis system based on the mobile platform and has also made a low cost reader for quantitatively analyzing urine dip sticks. He has received the DBT Biotech Process and Product Commercialization Award 2015 and the OPPI Young Investigator Award 2014 for UChék. He has been awarded the prestigious Vasvik Award 2013 for Biological Sciences and Technology for Suchek, which is an indigenous, accurate, low-cost glucometer supported by the Indian Council of Medical Research. Dr Srivastava is also the recipient of the prestigious Tata Innovation Fellowship Award from DBT for his translational work on diagnosing orthopedic implant related infections. Dr Srivastava is the proud recipient of the Bill and Melinda Gates Foundation GCE Phase 1 for an innovative work on drug delivery using microneedles. Dr Srivastava's lab has been placed third in the prestigious Healthcare Innovation World Cup organized by HIT Lab on solutions to management of diabetes with a cash award of \$5000. The Wellcome Trust UK has further funded this project for making an affordable point of care reader for critical care analytes. Dr Srivastava's lab is also the winner of prestigious 'Samsung Innovation Award 2012' organized by IIT Delhi (August 2012) for innovation 'Drishti' which has been transferred to Titan Eye for further development. Dr Srivastava has been conferred the Sr IYBA award in May 2013. He has received the INAE Young Associateship in 2013. He has received the prestigious INAE Young Engineer Award 2010. He is also the recipient of the prestigious DBT-IYBA 2009 award. He has also been elected a Member of the National Academy of Sciences, 2011. 40 of his current projects have been submitted as patent applications to the US and Indian Patent Office with some approved and several under examination. In a short duration of 11 years at IIT Bombay, Dr. Srivastava has already published in over 100 international journals with an h-index of 21. He is an active member on the DBT BIRAC Task force as well as the ICMR and DBT Task Force for translational research. Dr. Srivastava's lab is focusing on developing technologies that can be commercialized and brought to use for the common man in India.