

Entrepreneurial ID

«Academy-Industry Training Camp» 2016



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Project: CBioSen / Carbon material-based optical biosensors

Short description: Wearable optical sensors for continuous blood glucose monitoring

Status of project: <i>Idea</i>		Team size: 2
<p>Technology/science: We developed a near-infrared optical sensor that can be implanted under the top layer of skin for real-time blood glucose monitoring. The sensor contains an enzyme-conjugated carbon nanomaterial that is enclosed in a capsule by a glucose-permeable membrane. The enzyme ensures selectivity and sensitivity to glucose, and the carbon nanomaterial emits an optical response in the near-infrared light region in response to glucose detection. The signal emitted by the sensor can be measured wirelessly through the skin using a wearable optical device. The device reads out the sensor every three minutes and displays the blood glucose levels.</p>		
<p>Problem / Solution: Nearly 400 million people worldwide have Diabetes Mellitus: 52 million of them are Europeans, and almost 50 million diabetics live in India. Diabetes is a metabolic disorder that disables the intrinsic ability to control blood glucose levels. High glucose results in complications, such as heart attacks, strokes, diabetic food, cataracts, glaucoma, vascular diseases. In order to minimize complications caused by high glucose, these patients must monitor and control their blood glucose in to maintain healthy levels. We can provide a tool for autonomous glucose monitoring, making the everyday lives of diabetics easier.</p>		
<p>Market Opportunity / Target customers: The continuous monitoring of blood glucose levels will provide a higher level of security for patients, possibly reducing the consumption of required medication. With an implantable real-time sensor, glucose levels can be monitored autonomously with minimal patient commitment, leading to more efficient treatment plans. Patients suffering from diabetes and their medical doctors would be the target customers, as insurance companies would benefit from reduced medical costs.</p>		
<p>Competition and competitive advantage: Companies, such as Roche Diagnostics, Bayer, Medtronic, already provide solutions for glucose monitoring, but their devices have important limitations; single-use devices require patients to puncture their skin more than 4 times per day. Commercialized continuous monitoring devices have to be recalibrated every 24 h and their sensors typically have to be exchanged after 2 to 5 days. In comparison, the enzyme/nanomaterial-based sensor was reported to remain stable after 76 days of continuous operation.</p>		
<p>Team: The project is being developed in the Laboratory of NanoBiotechnology at École Polytechnique Fédérale de Lausanne (EPFL). The coordinator of the research platform is Prof. Ardemis Boghossian. Vitalijs Zubkovs' PhD research focuses on improving the enzyme/nanomaterial-based technology and developing a prototype of the complete device.</p>		
<p>AIT Camp objectives: In the scope of this training program, we want to estimate the market-entrance potential for our start-up idea. With the help of the professional AIT Camp team we will critically estimate the strengths and weaknesses of the project and establish collaborations between Switzerland and India.</p>		