

## **Sabancı University Technology Transfer Office ,Turkey**

Sabancı University Industrial Collaborations and Technology Licensing Office (ILO) gives its services under Research and Graduate Policies Directorate, the role of ILO is to facilitate commercialization, assist research activities and innovation initiatives to create social and economic benefits. Our value proposition is to provide an interface where researchers and enterprises mutually enjoy opportunities for efficient transfer of knowledge and collaboration that will enable the use of research outputs for the benefit of public and economy.

### **Services**

Sabancı University positions itself to be one of the most innovative and research-oriented universities in Turkey. Our research efforts are primarily directed towards applied and strategic research with the objectives of advancing and dissemination of knowledge and contributing to the progress of the community.

SU research targets include:

- Creating pioneering research fields with an interdisciplinary approach
- Strengthening the process by which research outcomes are transformed into social and economic values (translational research)
- Maintaining the integrity of research and education
- Leading international research fields effectively, using our local and regional advantages.

Scientific research at Sabancı University aims to be influential in applied areas. Researchers at the three interdisciplinary and non-departmental faculties of Sabancı University have the ability to conduct research without barriers. This structure provides a truly interdisciplinary research environment to the university.

- **Sector** :Technology Transfer

## **Team**

- MUSTAFA ÇAKIR, IP and Licensing

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## Innovamed

**Sector** :Electronics

InnovaMed is a design and new product development company with the goal to improve quality of life through research and technology based innovations. InnovaMed is specialized in developing wearable products and technologies for medical applications.

Vision: Development and commercialization of user friendly wearable products and technologies that provide creative solutions for medical problems

Values: Human centered, Creative, Multidisciplinary

### Description

Wearable Product Design for Medical Applications TENS (Transcutaneous electrical nerve stimulation) is the electrical stimulation of nerves to block pain sensation for therapeutic purposes. Compared to pharmaceuticals used for pain management, use of TENS units does not cause any side effects and provide instant pain relief while in use. TENS units can be supplied as over the counter alternatives to pharmaceuticals in chronic pain conditions. Currently available TENS units in the market are at least the size of a mobile phone and are composed of a control unit and electrodes hooked to this unit via cables. The low intensity current created by the TENS control unit is delivered to skin through conventional electrodes that stick to skin. The signals created by the TENS units first effect nerves beneath the skin and then are delivered to brain. As a result, the signals created by TENS unit disrupt the pain signals created by these nerves and decrease pain sensation.

The most common user problems related to conventional TENS use are electrodes not properly sticking on skin, cables tangling, cables and electrodes blanking off their socket during movement and finally stigma of using TENS units outside home because of their bulky structures. As a solution to these user problems, we propose a user friendly, electronic textile based, wireless, wearable TENS unit system.

### Primary Benefits

Proposed product is an electronic textile based, wireless, wearable TENS unit system in different forms suitable for major pain areas such as knee, elbow and neck. The product is composed of electrodes created by embroidering conductive thread on non-conductive textile surface and a circuit board and power supply snapped on this surface. The textile component of the TENS unit system comes in as a kit: an elbow sleeve, knee sleeve and a patch that can stick to body with double sided adhesives. The hard components (circuit board and power supply) can be transferred between textile components for treatment of different pain areas.

The proposed product allows users to move freely while wearing the TENS unit and eliminates problems of carrying a bulky device with tangling cables. Since the offered product is textile based it can come in different colors and patterns and improve the negative perception of using a TENS device with an aesthetically appealing look.

## Development Status

- **Stage of Development :** Prototype
- **Time to Market :** 1-3 year

## Market & Competition

The proposed product will be positioned in wearable technologies market pain management devices category.

Pain management devices are composed of electrical stimulation devices, radiofrequency ablation devices, and neurostimulation devices by product type. TENS units fall under electrical stimulation devices category

According to Ibis World market research report, pain management devices market share is expanding parallel to ageing population and is expected to expand %1.2 annually. According to this report the market share for conventional TENS units in the US is 516 million USD. In addition, according to American Academy of Pain Medicine more than 1.5 billion people suffer from chronic pain globally which makes up 1/5 of world population. When this ratio is proportioned to Turkish population excluding children and low-income levels, a market size of 7.5 million can be roughly estimated.

WiTouch, Quell and Cur are three commercial wireless TENS units available in the global marketplace. WiTouch is a wireless, TENS unit developed for specifically back pain. The size and shape of the device is designed to fit the lumbar area the back and is controlled with a remote control. Quell is another wireless TENS unit that sits in a textile pouch that can be wrapped around arm or leg. Cur is a patch like wireless TENS unit which can be controlled remotely with mobile phone.

Compared with WiTouch, proposed product can be used on any part of the body with pain condition while WiTouch only fits in the lumbar region. WiTouch is a plastic based device, which limits its wearability, whereas proposed solution is a soft textile based alternative that can be comfortably used on the go.

Compared with Quell, proposed product can be used on any part of the body with pain condition while Quell can be only worn around the leg or arm. Quell is plastic based device which fits in a textile carrying pouch while proposed product is an electronic textile structure.

Compared with Cur, both products are in the form of a patch that stick on body with adhesives and provide a wireless and comfortable TENS therapy. Cur is composed of a textile surface that should be replaced after each use while proposed solution is a TENS unit system with multiple use capacity.

## Potential Sectors

Electronics  
Personal Care

## Potential Regions

EU  
United States

## **Interest In**

InnovaMed is looking for funding and expertise to commercialize the proposed wearable TENS unit system.

## **a Compact And Effective Device For Detecting Cellular Stress Induced By Toxic Chemicals**

**Sector** :Environmental

This novel E.coli biocapacitor chip device determines cellular stress induced by toxic chemicals at a chemical-biocapacitor interface. This interface contains living bacterial cells that interact with toxic chemicals and change their electrical properties depending upon the toxic nature of the chemical. The biocapacitor then captures this signal that enables distinguishing toxic from non-toxic chemicals to the living cells.

### **Description**

This technology offers a compact, accurate and efficient solution to detect toxic/harmful chemicals on living cells directly to determine their biological response to toxic chemicals within minutes. This feature makes the biocapacitor sensing device technology superior to other devices in the market since no laboratory equipment or trained personal is required. The technology offered herein provides a more compact, less expensive solution with the advantageous features such as:

- Viable bacterial cells as recognition elements interfaced with electronic capacitor device (Biocapacitor)
- Carbon nanotubes for the enhancement of the signal's sensitivity
- Direct exposure of toxic chemicals, drugs or environmental samples on biocapacitor
- No liquid or nutrient medium required
- Flexible range of frequencies
- No additional chemicals in order to detect the signal

### **Primary Benefits**

- Easy-to-use device for measuring and detecting the toxicity of unknown chemicals or drugs, to predict the impact of such chemicals on humans
- Ability to screen a wide variety of chemicals, toxic gases, pharmaceuticals, drugs, defense agents, environmental and food samples for the determination of potential cytotoxicity
- Knowing direct biological effects of unknown chemicals
- High sensitivity and selectivity
- Cost effectiveness

### **Development Status**

- **Stage of Development** : Prototype
- **Time to Market** : 1-3 year

### **Market & Competition**

The global life science & chemical instrumentation market is estimated to grow at a CAGR of 7.9% to reach \$45.4 billion by 2018.

Most efforts and R&D investment for chemical sensing and testing technologies are in laboratory-based methods. Devices for such use have started to permeate the markets in recent years and hold great potential for the near future.

**Potential Sectors**

Medical  
Pharmaceutical

**Potential Regions**

Turkey  
United States

**Interest In**

This technology is applicable in the following industries:

- Medical and clinical diagnosis
- Pharmaceuticals
- Environmental monitoring
- Food monitoring
- Defense

## **A Compact And Efficient Biosensor For The Detection Of Chemicals And/or Biological Molecules**

**Sector** :Environmental

This innovative and portable biosensor is able to effectively and efficiently detect the type and amount of biological and chemical agents in environment. This user friendly portable device is ideal for quick and precise field tests and does not require its user to have technical training to interpret the result.

### **Description**

This technology proposed herein is related to a biosensor implementation wherein, input signals to the transceiver are target biological / chemical agents causing a change in the dielectric constant of the electrical device, exposed to environment, integrated into the circuit of the transceiver, hence causing a change in the parameters of the radio frequency outputs of the said circuit and by this change the type and amount of biological/chemical agents can be detected.

Biosensors are already being used in practice for the detection and quantification of target molecules in complex mixtures such as body fluids, water and environmental samples using conventional HPLC, Gas chromatography and other analytical instruments that provide only chemical information. Since the said method is inexpensive and fast and enables label-free detection and low sample consumption, there is an effort for enhancement of this technology. The technology we present herein, overcomes several obstacles specific to obtaining not only chemical information but also biological information using living biological cells interfaced biosensor technology. The said biosensor identifies biological response of a test chemical and provides the information on the nature of a test chemical (harmful chemicals) with better sensitivity and detectable ranges with high signal-to-noise ratio.

### **Primary Benefits**

- Works with low amounts of samples
- Low production cost for the transducer
- Optimizable integrated/interdigitated capacitor for increasing the active area
- single/integrated transceiver transducer can also reduce the signal loss and also suppress the noise otherwise could be coming/generated from discrete integration effective/efficient signal transfer enabling remote sensing application such as biological warfare agents, environmental hazardous agents such as nuclear/chemical/biological wastes
- Disposable and lower system costs attractive to be used in applications such as process control/monitoring of medical, defense, environment and food samples

### **Development Status**

- **Stage of Development** : Prototype
- **Time to Market** : 1-3 year



## Market & Competition

Biosensors play a vital and essential role in medicine, defense, environment and food industries, providing routine analysis, crucial monitoring, and early detection toxic chemicals, warfare agents, biological toxins . In addition, there is a growing use of biosensors in homeland security situations, as well as pharmaceutical research.

The market for biosensors is categorized as a growth market. There is a rising trend of revenues from markets such as security, environment, domestic biodefense and diagnostics increased from 2006 to 2009 and 2016 forecasts suggest that this growth trend will continue. It is estimated that the global market for biosensors has increased to 18.9 billion USD by 2019

### Potential Sectors

Agriculture  
Environmental

### Potential Regions

Turkey  
EU

## Interest In

This technology is applicable in the following industries:

Environmental Monitoring:

- Industry
- Agriculture
- Pollution

Medical

- Clinical Chemistry
- Diagnosis/screening

Food Quality

- Quality control
- Toxin detection

Defense

- Chemical warfare agents detection
- Biological warfare agents detection

This technology can be utilized for efficient sensing and detection of biological and/or chemical agents in applications such as BioMedical Analysis, Detection of biological and chemical warfare agents and wastes as well as in environmental applications for water and air quality monitoring.

## 3D Bio-Printing Of Artificial Biological Tissue Networks

**Sector :**Healthcare

The present invention relates to a method 3D Bio-printing of artificial biological tissue networks. This technology provides a branched, self-supporting, scaffold-free artificial hollow biological tissue network for replacement of living tissue.

### Description

This technology provides a branched, self-supporting, scaffold-free artificial hollow biological tissue network for replacement of living tissue.

This computer-controlled 3D bio-printing technique achieves a natural mechanical strength in a shorter time, with a high reproducibility and without requiring any manual intervention.

Users can print living cells into reproducible and realistic tissue and organs without the need for supporting scaffolds. These can then be used directly for transplantation.

### Primary Benefits

- Use of living cells makes the product more biocompatible
- Self-supporting and scaffold-free tissue
- High natural mechanical strength in a short time
- High reproducibility
- Manual intervention is not required
- Direct transfer of medical image to living tissue

### Development Status

- **Stage of Development :** Prototype
- **Time to Market :** 1-3 year

### Market & Competition

The 3D printing market has seen rapid growth in recent years due to its increasing applications across different sectors. Global 3D Printing Market set to hit USD 7,240 Million by 2019.

Since 2011, interest in the 3D bio-printing technology has witnessed a huge growth. In the base scenario, it is anticipated the overall market to reach USD 73 million by 2024. This represents an annualized growth rate of 114%.

### Potential Sectors

Medical  
Healthcare

### Potential Regions

Turkey  
EU

## **Interest In**

This technology is applicable in medical, healthcare and the biotech R&D industry.

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## **Mirnas For Diagnosis, Prophylaxis, Treatment And Follow-Up Of Autophagic Diseases**

**Sector :**Healthcare

This novel technology introduces an efficient way to identify the cellular degradation in cellular functions by utilizing specific miRNA families to diagnose existing or potential pathologies enabling fast and efficient diagnosis, prevention and therapy of a wide range of autophagy-related diseases such as cancer, alzheimers, early dementia and hereditary diseases.

### **Description**

This technology involves regulation of the autophagic pathway at multiple levels via a specific miRNA family or its inhibitors.

Therapeutics and diagnostics can be designed around these miRNAs to enable efficient and fast ways to diagnose, prevent or treat diseases arising from excess autophagy by blocking autophagic pathways in cells. Conversely, the diseases occurring because of deficiencies in autophagy can be controlled by suppressing these miRNAs with inhibitors, thereby reinstating autophagic pathways. Mechanistically, miR-376 family of micro RNAs were shown by us to decrease cellular levels of key autophagy proteins Beclin 1 and ATG4.

### **Primary Benefits**

- miRNAs are generally more stable than proteins and other forms of RNA, hence are suitable candidates for incorporation into point-of-care diagnostic kits
- miRNAs are organic molecules and natural antisense interactors
- miRNA expression profiles can be used to diagnose disease states as deregulated miRNAs contribute to the initiation and development of diseases
- Many miRNAs are master regulators that modulate many genetic, biological and pathological processes
- Mouse models mimicking human disease show that miRNAs play important roles in various disease progression, hence are good targets for therapeutic development
- Their small size (22-24 nucleotides in length) and organic nature make them very attractive for drug development.

### **Development Status**

- **Stage of Development :** Prototype
- **Time to Market :** 1-3 year

### **Market & Competition**

MicroRNA based research for diagnostics and treatment is a promising emerging field in drug research and several large pharmaceutical companies have already invested substantially into miRNA-related research and therapeutics. (See Melnikova I, Nature Reviews in Drug Discovery 2007).

The total global microRNA market was valued at nearly US\$338.3 million in 2012 and expected to reach US\$763 million in 2017 after increasing at a five-year compound annual growth rate (CAGR) of 17.7%.

Our identification of the “hsa-miR-376” family of miRNAs as potential candidates for drug and diagnostics development is timely to meet the growing demands of this new market segment. RNA therapeutics offer the advantage of low cost synthesis and stability, and as organic molecules that can be targeted specifically are anticipated to have less side effects on patients.

**Potential Sectors**

Pharmaceutical  
Nanotech

**Potential Regions**

Turkey  
United States

**Interest In**

This technology is applicable in the following industries: Pharmaceuticals

This class of miRNAs have potential applications in diagnosis, prophylaxis and treatment of diseases involving autophagic abnormalities such as

- Neurodegenerative and nervous system diseases
- Cancer
- Heart and liver diseases
- Ageing
- Myopathies
- Auto-immune and inflammatory diseases and immune deficiencies
- Infectious diseases
- Ischemic diseases
- Diabetes
- Axonal injury
- Lysosomal storage diseases

## **Cavitation Apparatus For Medical Use For Treatment Of Kidney Stones, Prostate Hyperplasia And Cancer Cells**

**Sector :**Healthcare

This cavitation apparatus offers cost-effective and energy efficient treatment tool with a localized effect for treatments of urological diseases such as prostate, kidney stones. This device utilizing “hydrodynamic sources” can be used for a variety of treatments such as destroying kidney stones or killing infected cancer cells.

### **Description**

Ultrasound therapy is a non-invasive treatment, where some difficulties are faced in targeting the precise location (kidney stone, cancerous prostate tissue) of the treatment, and the energy requirement of ultrasound therapy makes this method of treatment expensive.

This cavitation apparatus including nano/micro size flow restrictive channels generates continuous micro/nano sized bubbles.

Generated hydrodynamic bubbly cavitation is highly destructive on the target surfaces once they are localized. This device can be utilized for a variety of treatments due the advantages of localization with the use of vision based control components and micromanipulators. Localization plays a key role in preserving the healthy tissues from destructive effect of the treatment compared to ultrasonic applications. These features of this specific technology result in a relatively cheap, energy efficient, and multipurpose medical device.

The destructive energy coupled with a cost effective device well overlaps with the therapy duration ranges for the other methods. Furthermore, the diameter of the cavitation probe is designed to fit into a regular endoscopy device making the developed technology an easy to implement tool for medical device manufacturers especially for the endoscopic device providers/manufacturers.

### **Primary Benefits**

- Cost effective
- Multiple Use
- Energy Efficient
- Multi-purpose medical device

### **Development Status**

- **Stage of Development :** Prototype
- **Time to Market :** 1-3 year

### **Market & Competition**

Global untrasound devices market expected to reach USD 8.71 Billion in 2019. This device presents an attractive alternative and cost effective solution to medical device

manufacturers.

**Potential Sectors**

Healthcare  
Medical

**Potential Regions**

Turkey  
United States

**Interest In**

This technology is applicable in Healthcare:

- Destroying kidney stones
- Treating Benign Prostate Hyperplasia,
- Killing infected cancer cells

## **An Active Joint For Rehabilitation**

**Sector :**Healthcare

This technology describes a “self-adjusting exoskeleton joint” for robot-assisted treatment of neurological injuries and rehabilitation”. This technology offers an effective, ergonomic and cost efficient treatment method, enabling complex joint movement accommodation, high rotational torque, coupled to a compact design for physical rehabilitation therapies.

### **Description**

This novel “device for robot-assisted rehabilitation” offers an effective, ergonomic and thus cost efficient treatment by means of complex joint movement accommodation, high rotational torque and compact design for physical therapies.

The novelty that is brought by this technology originates from its “kinematic structure/design” that allows both translational movements of the joint along with the rotational movements.

### **Primary Benefits**

- Perfect match between the human joint axis and the device axis, guaranteeing ergonomic and comfort for the patient
- Extended usable range of motion (RoM) for movements of the shoulder complex
- Self-alignment feature significantly shortens the setup time required to attach the patient to the exoskeleton
- Ability to deliver glenohumeral mobilization and scapularstabilization exercises, in addition to shoulder rotation exercises
- High reproducibility and measurement of movements of the shoulder complex

### **Development Status**

- **Stage of Development :** Prototype
- **Time to Market :** 1-3 year

### **Market & Competition**

According to WHO statistics, neurological injuries are the leading cause of serious, long-term disability in developed countries and each year over 15 million people suffer from long term neurological injuries, such as stroke. In US, the estimated average direct cost of stroke per patient during the first 3 months of treatment is about 15 thousand dollars, while for over 10% of cases, the cost increase up to 35 thousand dollars or higher.

Physical therapy is an indispensable element for the treatment. Treatment is more effective when exercises are repetitive, intense, long term and task specific. Use of



robotic devices in assistance of repetitive and physically involved rehabilitation exercises significantly reduces the application related costs. Moreover, robot-mediated rehabilitation therapy allows quantitative measurements of patient progress, guarantees patient safety, and increase accuracy of tasks with high repetitions, and can be utilized to realize customized, interactive treatment protocols.

**Potential Sectors**

Healthcare

**Potential Regions**

Turkey

EU

**Interest In**

This technology is applicable in the healthcare organizations for the use of physical therapy for complex human joints such as shoulder and pelvis-hip joint complex.

## **Makromek Endüstriyel Mekatronik**

**Sector :**Healthcare

This product presents a wearable, temperature monitoring device that provides caregivers with continuous body temperature data up to 24 hours to Android compatible device via mobile phone.

### **Description**

This technology is used for monitoring and detecting fever

### **Primary Benefits**

- Monitor their temperature from the next room, allowing the babies to sleep soundly
- Comfortable to wear and easy to remove
- can be installed on any android based mobile device
- can be used also for cancer treatment and after organ transplantation for remote monitoring
- sensible up to 0.1 °C temperature change

### **Development Status**

- **Stage of Development :** Pre-Commercial use
- **Time to Market :** 1-3 year

### **Market & Competition**

The expansion of the global thermometer industry is forecast to reach 6.2% p.a. in the coming years. Between 2007 and 2013 the market increased with an average annual growth of 8.4%. Currently, liquid-filled thermometers account for 8.6% of the global demand while other thermometers have a 91.4% share of the market.

### **Potential Sectors**

Healthcare  
Personal Care

### **Potential Regions**

Turkey  
Turkey

### **Interest In**

We are seeking funds to accelerate the process of commercial model, and bring the product to commercialisation stage within the following 6- to 12-month period.

## Ti Medikal

**Sector :**Healthcare

This invention present a combined system developed for use in the treatment of anorectal fistulas. The fistulectome instrument is a combination of two set of pieces, a cannulation apparatus and coring out excision system

### Description

This invention present a combined system developed for use in the treatment of anorectal fistulas. The fistulectome instrument is a combination of two set of pieces, a cannulation apparatus and coring out excision system

### Primary Benefits

This novel technology can be implemented for anorectal fistula which is an abnormal channel that leads from the anus or rectum usually to the skin near the anus

- protect the anatomical and physiological properties of the anorectal region
- minimization of the issues in the conventional treatment
- decrease the length of hospitalization
- reduce the loss of labor force
- cost effective

### Development Status

- **Stage of Development :** Commercially ready
- **Time to Market :** Less than 1 year

### Market & Competition

The global endoscopy equipment market is expected to reach USD 33.6 Billion by 2020 from USD 23.8 Billion in 2015, at a CAGR of 6.1%.

Gastrointestinal endoscopy is expected to be the second-largest application area in 2015

In 2015, North America is poised to account for the largest share of the endoscopy equipment market, followed by Europe and Asia-Pacific. However, the Asia-Pacific market is slated to grow at the highest CAGR during the forecast period and serve as a revenue pocket for companies offering endoscopy equipment.

### Potential Sectors

Healthcare

### Potential Regions

United States

United Kingdom

### Interest In

We are seeking funds to bring our technology in to the market

## Mitos

**Sector :**Healthcare

Breast cancer tissue detection and imaging

### Description

This technology is related to a novel method and device for identifying and detecting cancer cells with microwave light. The method is safer than X-ray mammograms which is the most widely used method for Breast Cancer diagnosis. The method is also effective and cost-efficient.

### Primary Benefits

This new technology;

- Enables detection of tumors as small as 1mm in diameter
- Able to identify malignancies
- Determines the location of the tumor accurately
- Is able to detect the cancer cell independent of the age of the patient
- Technology is being a superior alternative to most widely used breast cancer diagnosis method - X-ray mammography since it is
- Cost-efficient
- Much safer since the microwave light is non-ionizing unlike X-Ray

### Development Status

- **Stage of Development :** Commercially ready
- **Time to Market :** Less than 1 year

### Market & Competition

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#### Potential Sectors

Healthcare  
Personal Care

#### Potential Regions

United States  
EU

### Interest In

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## **Handheld Device For Early Detection Of Multiple Cancer And Cardiac Disease Biomarkers**

**Sector :**Healthcare

Early detection of cancer and cardiovascular diseases (CVD) is very important to increase the survival rate of patients in critical conditions. Therefore, it is necessary to have a reliable detection tool for cardiac and cancer markers which could probe a combination of biomarkers towards a highly accurate diagnosis and provide a multi-parametric detection system.

### **Description**

Several methods are available but they still hold several limitations concerning portability, sensitivity, and cost-effectiveness. In order to overcome these problems, the point-of-care hand-held diagnostic device was developed.

This technology is a hand-held point-of-care diagnostic device that incorporates a lab-on-a-chip module with interdigitated capacitive biosensors for label-free detection of multiple cancer and cardiovascular disease biomarkers.

Interdigitated capacitive (IDC) sensors previously developed by our researchers for the detection of multiple CVD and cancer biomarkers, has been extended to a fast, low-cost hand-held point-of-care diagnostic device. For this purpose, a novel circular IDC-based biosensor in 2x6 capacitive arrays capable of detecting a panel of biomarkers in human serum is designed, fabricated and verified.

The developed prototype is comprised of a capacitive bio-detection chip, a sensitive capacitive readout electronics enclosed in a hand-held unit and a data analysis software calculating the quantity of biomarkers.

The device uses pre-activated ready-to-use cartridges, composed of capacitive biosensors, which can be stored 3 months under optimal conditions, and is capable of on-site diagnosis and can report the result in less than 30 minutes.

Target biomarkers used for the verification of the point-of-care hand-held diagnostic device, that is indicative of CVD and cancer, are BNP (CVD), SAA (cancer), IL-6 (CVD and cancer), Fibrinogen (CVD and cancer), Troponin-I (CVD) and TNF- $\alpha$ , VEGF and HER2 (cancer). These biomarkers are tested with real blood samples. However, the developed device is not limited to the listed biomarkers.

### **Primary Benefits**

Technology Features And Specifications:

- The hand-held unit is designed in a way that it enables the easy use of pre-activated cartridges and ensures a reliable connection with IDC sensor.
- The hand-held unit also incorporates a small computer that the software runs on it and a touch-screen to control the operation of the device and to display the results on the screen.

- The device has the essential features of fast, on-site, low cost and accurate diagnosis and prognosis of cancer and cardiovascular diseases.

#### Customer Benefits:

A prototype point-of-care hand-held diagnostic device was developed to detect cancer and CVD target biomarkers. The device incorporates interdigitated capacitive sensors in a storable cartridge that can be inserted into the device. The is can detect multiple biomarkers simultaneously and display the results in less than 30 minutes. The cartridges can be pre-activated with the target antibodies and can be stored 3 months under optimum conditions.

The device does not compete with advanced, expensive laboratory tests in terms of accuracy. It is intended to be used in the first level health facilities, areas that have limited access or no access to advanced laboratory tests.

#### Development Status

- **Stage of Development** : Prototype
- **Time to Market** : 1-3 year

#### Market & Competition

In 2017, a total of 1.7 million new cancer cases are estimated to be diagnosed in the US alone; during the same time period, close to 0.6 million patients are estimated to die due to cancer. Therefore, in addition to satisfying the unmet market need for advanced and efficient treatment interventions, early cancer diagnosis and screening form an important component of disease prevention and cure.

Due to the increasing prevalence of diabetes, cancer, and cardiac diseases, the global point of care diagnostics market has a large potential to drive the overall market growth.

The global point-of-care diagnostics market is projected to reach USD 38.13 Billion by 2022 from USD 23.71 Billion in 2017, at a CAGR of 10% during the forecast period.

#### Potential Sectors

Healthcare  
Chemistry

#### Potential Regions

Turkey  
United States

#### Interest In

looking for partners for licensing.

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## **A Novel Full-Duplex Protocol For High Performance Wlans**

**Sector :**Information Systems

Wi-Fi products have been widely deployed around world with the facts of more than three billion Wi-Fi devices estimated to be shipped in 2017 and more than eight billion Wi-Fi devices currently in use in order to satisfy the fast growth in user demands on data communications through, for example, home/enterprise networks, services for the public (e.g., airports, aircrafts, train stations, shopping centers etc.), augmented/virtual reality (AR/VR) and IoT, and so on. Dense deployment of Wi-Fi devices and potential high demands on data throughputs per device as well as short latency require advanced Wi-Fi systems to operate with high spectrum efficiency and good performance.

### **Description**

Full Duplex (FD) for wireless systems is a technology that allows a device to simultaneously transmit and receive wireless signals. FD can significantly increase the throughput for each allocated channel and furthermore improve the total system capacity. But only half of the physical bandwidth is available for one way wireless communication since the channel needs to be partitioned for transmitting and receive operations either in the frequency or time domain. This is because a wireless node cannot transmit and receive over the same frequency band at the same time. The reason that FD communication has not yet been possible in wireless systems is the significant amount of self-interference.

This technology is developed for improving the performance of wireless networks. It is a method of and system (synchronized contention window (S-CW) full-duplex (FD) protocol) to enable FD communication in wireless local area networks (WLANs) for improving the performance of WLANs by using S-CW FD protocol as a MAC scheme.

The S-CW FD protocol according to this invention can be applied to different FD scenarios (bidirectional or relaying) via the same access mechanism, and it can work together with IEEE 802.11 legacy nodes. Hence, S-CW FD is not only flexible but also it can be easily implemented by making use of the off-the-shelf WLAN hardware and firmware.

S-CW FD protocol is therefore presented as a generic, easy to implement MAC protocol, which enables FD in WLANs, while supporting legacy HD IEEE 802.11 nodes, which is named as one of the challenges that FD MAC protocols face in the future. A contention window synchronization mechanism is proposed to adjust the backoff slots of the communicating nodes in order to enable simultaneous transmissions.

### **Primary Benefits**

Technology Features & Specifications:

- This technology proposes a synchronized contention window (S-CW) full duplex MAC

as a protocol for enabling FD in WLANs for enhanced throughput.

- Synchronized contention window full duplex protocol of the invention doubles the throughput of HD WLANs, but this gain decreases with increasing number of nodes in the network.
- This technology proposes Synchronized Contention Window Full Duplex protocol as a modified form of IEEE 802.11 MAC with mechanisms to support the FD operation, so as to synchronize the involved nodes with minimal overhead.
- The main advantage of S-CW FD is its simplicity, due to easy implementation on off-the-shelf 802.11 equipment.
- The S-CW FD of this technology provides 1.5-2 times higher throughput in comparison to HD legacy WLANs, in the case there are no hidden nodes in the network.
- RTS/CTS is no longer necessary for FD, since by nature FD solves the hidden terminal problem.
- S-CW FD works in bi-directional scenarios where two nodes communicate simultaneously with each other.

Potential Applications:

- WLAN devices
- Wireless chipsets • WLAN adapters

Customer Benefits:

- Enabling FD in WLANs for enhanced throughput.
- Providing 1.5-2 times higher throughput in comparison to HD legacy WLANs.
- Improving the performance of WLANs.
- Easy implementation.

## Development Status

- **Stage of Development** : Pre-Commercial use
- **Time to Market** : Less than 1 year

## Market & Competition

The major driving factor of the WLAN market is the increase in the adoption of cloud computing and growth of telecommunication, residential and commercial sector. However, rise in privacy and security issues in the age of IoT restrains the market growth. On the contrary, the development of 5G technology is expected to create lucrative growth opportunities in the future. The requirement for smartphones, tablets, laptops, and media-intensive applications in business environments is putting greater, and different demands on high-performance WLANs.

**Potential Sectors**  
Information Systems  
Communications

**Potential Regions**  
United States  
Turkey

## Interest In

Looking for licensing partners especially developers of WIFI technologies.



## **Biometric Signature Verification**

**Sector :**Information Systems

Biometric verification is the verification of a person's identity through one of his/her biometric data (e.g. biometric signature, fingerprint). Signature verification technologies are used in online banking, bank cheque clearing (offline or image signatures), and credit card purchases (online or biometric signatures), world-wide.

For services in application areas where signature verification is extremely important, such as banking transactions; An innovative 'biometric signature verification system' has been developed that decides whether the signature from the customer belongs to the real customer.

This technology has received the first place positions in many international competitions (SVC2004, 4NSIGCOMP2010, SigComp2011, SigWiComp2013, SigWiComp2015).

### **Description**

This technology uses Dynamic Time Warping (DTW) algorithm to optimally align two signatures of varying lengths and measure their dissimilarity. DTW is a dynamic programming algorithm where the best global alignment is found by comparing all possible alignments between two sequences, while avoiding unnecessary computation.

Signatures are collected by the use of the Front End UI, subsequently encrypted by using the API and stored on the SQL Server as a reference. On a verification page, the Front End UI collects a signature and using the API, reaches the Verification Engine to verify the collected signature against reference signatures on the SQL Server.

Technology Features & Specifications:

- SQL Server database that holds a set of user signatures that are encrypted. The database can be hosted by the customer so long as there is remote access to it.
- The signatures are only identified by a user ID defined by the customer, to provide an anonymized solution. Currently, we offer MySQL, MS SQLServer, MS SQL Express solutions. Other platforms can be used as well, with minimum customization.
- Verification Engine provides a high-performance scalable platform. This engine is provided as a service on Azure Cloud. Access to it is exclusively through the API and SSL connection.
- API offers a gateway to the verification engine and SQL Server. The API provides an encrypted SSL connection to Azure Cloud Verification Engine, exposing only a few functions calls as REST services. API guarantees a platform

and language independent solution.

- Front End UI is a Javascript library to collect signature points. Thanks to Javascript, it will work on any platform.

## Primary Benefits

Potential Applications:

Biometric Signature Verification is the most natural solution to the problem of authenticating documents digitally. Because the personal signature has always been strongly integrated in our social, legal and commercial lives, Biometric Signature Verification applies as a universally accepted authentication method in the electronic age.

Signature verification technologies are used in online banking, bank cheque clearing (offline or image signatures), and credit card purchases (online or biometric signatures), bank and credit card transactions and authentications in laptops/PDAs.

Customer Benefits:

A standard verification system uses a threshold to accept or reject a signature, but a global threshold does not work well. For instance, longer and more complex signatures result in higher dissimilarity scores (both for genuines as well as forgeries), while simpler/shorter signatures result in lower dissimilarity scores. We normalize dissimilarity scores using reference set statistics so that they can be compared to the global threshold.

It is more unique and more difficult to forge.

## Development Status

- **Stage of Development** : Prototype
- **Time to Market** : Less than 1 year

## Market & Competition

Global signature verification market is expected to grow to \$134.51 mn by 2021. The global signature verification market will grow at a CAGR of 8.67% during this forecasted period.

One of the major reasons for the market growth is the increasing level of security breaches and transaction fraud, which leads to a need for highly secure identification and personal verification technologies.

Dynamic signature verification technology is quickly replacing paper-based signatures

and has the potential to dominate the global signature verification market. This signature verification technology is gaining prominence in different industry verticals such as banking, healthcare, government, manufacturing, communications, real estate, retail, and education. It helps them reduce transaction time, cut expenses related to manual paper-based processes, and increase compliance and security.

North America is the largest region in the signature verification market. Emerging new organizations and need for protection against identity theft is a major driver.

**Potential Sectors**

Information Systems  
Data Processing

**Potential Regions**

Turkey  
India

**Interest In**

Looking for licensing partners such as Banks.

## Active Food Packaging Material

**Sector :**Materials

The present invention relates to the incorporation of halloysite nanotubes into polymeric films to obtain active food packaging materials having antibacterial, ethylene scavenging, and barrier properties.

### Description

Active and multifunctional packaging materials are facing increasing demand because of the changing trend of the customer needs such as safety and long shelf life of the food material without however interfering with processed materials, preservatives and additives. In order to have safe active food packaging it is crucial to choose active packaging material through incorporation of antibacterial agents. This technology presents the use of the polymeric films comprising of halloysite (aluminosilicate clay) nanotubes as a packaging material for food products. The said halloysite nanotubes are incorporated with active agents, such as antibacterial agents (preferably from a natural source) for providing antibacterial, barrier and ethylene scavenging properties.

### Primary Benefits

Ability to absorb and release substances that enables the function of the active packaging  
Providing antibacterial, barrier and scavenging properties all within the same product  
Active food packaging properties without using detrimental and harmful agents to human health  
Uses sustainable raw materials  
Easily recyclable

### Development Status

- **Stage of Development :** Prototype
- **Time to Market :** Less than 1 year

### Market & Competition

The active food packaging market size is estimated to grow from USD 7.28 Billion in 2015 to USD 10.00 Billion by 2021, at a CAGR of 5.54%. The antimicrobial packaging market is growing rapidly in accordance with the growth in the packaging market, globally. Antimicrobial packaging is widely used in the food industry as a result of the rising consumer demand for products that are perishable, preservative-free, and minimally processed, and also due to the need to increase the shelf life of the products.

### Potential Sectors

Materials  
Packaging

### Potential Regions

EU  
United States

## **Interest In**

Looking for licensing options

## **High Performance Modified Superplasticizer For Cement**

### **Sector :Materials**

To increase the workability of concrete, aqueous solutions of superplasticizers are added to cementitious mixtures. The strength of concrete is inversely proportional to water content that is used in the mixing process. Superplasticizers are used to lower the water to cement ratio, while keeping necessary fluidity, to make high-performance concrete. Although conventional superplasticizers (e.g. melamine and naphthalene based polycondensates) reduced the amount of water needed for workable mixtures, their ability to retain flow over time is limited.

The new generation of superplasticizers (i.e. polycarboxylate ether-based superplasticizers (PCEs)) exhibit superior dispersing ability compared to the conventional superplasticizers due to their special chemical and structural properties.

### **Description**

This technology provides high performance modified PCEs without using any chain transfer agent and a complex initiator system. Molecular weight of the polymer is controlled by pre-adjustment of pH level of the polymerization medium. Since the pH level of the final product is approximately 7 - 8, a neutralizing step at the end of the process is eliminated. Initial reaction medium contains all the monomers such that the step of the gradual addition of monomers throughout the reaction is eliminated and also addition of the initiator is limited to two parts; at the beginning and in the middle of the reaction.

### **Primary Benefits**

This modified superplasticizer exhibits higher fluidity and slump retention compared to commercially available superplasticizers and remains effective in medium with high concentration of sulfate ions.

This technology also provides a simple cost-effective and environmentally friendly production method of such additive.

### **Development Status**

- **Stage of Development** : Prototype
- **Time to Market** : Less than 1 year

### **Market & Competition**

The global construction chemicals market (2015–2020) is estimated to reach USD 33.98 Billion by 2020 growing at a rate of 7.62% between 2015 and 2020.

The highest opportunities for growth of construction chemicals is expected from residential and infrastructure projects. Cement is considered as one of the key

enablers for modern construction. Concrete is used as an essential material for all types of construction; including residential, non-residential, industrial, and civil engineering. Besides rising use of advanced PCE-based superplasticizer formulations with viscosity modifying and high-strength water reducers in precast applications is expected to boost the overall demand for concrete admixtures. Polycarboxylic-ether (PCE) is expected to witness the highest growth in consumption among superplasticizers due to its high water-cement reduction at comparatively lower dosage rates.

**Potential Sectors**

Materials  
Manufacturing

**Potential Regions**

EU  
United States

**Interest In**

Looking for licensing options.

## **A New Biocoating For Enhanced Heat Transfer**

### **Sector :Materials**

Boiling heat transfer is used in a variety of industrial processes and applications, such as refrigeration, power generation, heat exchangers, cooling of high-power electronics components and cooling of nuclear reactors. Enhancements in boiling heat transfer processes are vital and could make these typical industrial applications more energy efficient. There is a universal demand for producing more effective heat removal systems involving boiling heat transfer. The current problem is that heat transfer process in electronic devices and other systems are inefficient due to low critical heat flux and low heat-transfer coefficient.

In this invention, we propose biocoatings for performance enhancement in boiling. This biocoating is organic, biocompatible and is also applicable to different industrial fields such as refrigeration applications where enhanced performances are sought.

### **Description**

This biocoating as a totally new or combinatory coating solution provides many other solutions against the problems that other conventional coating materials have failed because of their characteristics.

Due to the porous structure of this coating, biocoated surfaces have much more active nucleation sites in comparison to the bare surfaces and have higher performance. This technology has the potential of offering both biocompatibility and enhanced performance. We propose the usage of this coating on multi phase heat exchanger surfaces.

This invention could offer a significant alternative to surface enhancements in microchannels/tubes as well as conventional coatings since the method is easy to implement, efficient, cost-friendly, less dependent on the surface shape and organic. Moreover, this technique could be also used for closed geometries such as microtubes, where physical deposition techniques are not applicable. This invention could be the best candidate to increase the boiling heat transfer coefficient and heat flux.

### **Primary Benefits**

- \*This coating is applicable to any surface. It can be coated on the surfaces of multi phase heat exchangers being used in refrigeration and other fields.
- \*No required investment for the implementation of the coating. Standard exchangers and evaporators in refrigeration systems could be easily coated.
- \*Invention complies with the standards in refrigeration systems.
- \*Resistant to harsh conditions. This biocoating can stay alive under physiologically harsh conditions such as low or high temperatures, high salinity, and low or high pH.
- \*The thickness of the biocoating can be controlled with the concentration, that's why it can be coated in desired thickness.
- \*It can be applied to closed geometries.



\*It is possible that the bacteria can leave the surface by changing the conditions of the environment.

\*Easy to integrate into the system.

\*Easy to clean.

### **Development Status**

- **Stage of Development** : Prototype
- **Time to Market** : Less than 1 year

### **Market & Competition**

This technology has been tested for water, and it can be used to design specific surfaces that are advantageous to other fluids. Listed below are a few target industries that can create technology-gains for the existing products.

This biocoating technology can be utilized in several areas and products such as;

\*Electronics Cooling

\*Microprocessors

\*Data Centers

\*HVAC and Refrigeration

\*Boiler and Heat Exchangers

\*Bio-medical Applications

\*Defense Application

### **Potential Sectors**

Energy

Materials

### **Potential Regions**

EU

United States

### **Interest In**

Looking for licensing options.

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## High Performance Desalination Membrane

### Sector :Materials

Reverse osmosis (RO) membranes are used in the field of desalination technology. Nowadays, more than 16 million m<sup>3</sup>/d of water is treated by this means. RO membranes can be classified by the type of membrane material as cellulose acetate, thin- lm composite, and ceramic membranes. Thin- lm composites (TFC) are the most widely used membranes in the global market.

Recent developments focus on additives for the active layer of TFC desalination membranes, which change the chemistry and structure of the interfacially polymerized film, in order to increase hydrophilicity and water flux, improve adsorption and diffusion of reactants, or impart antifouling properties.

### Description

The aim of this technology is the use of zwitterionic moieties as co-reactants or coatings for the active layer of TFC desalination membranes in order to increase their performance. Zwitterionic trialkoxysilane sulfobetaine monomers (SPPT) were used in the interfacial polymerization process for the preparation of thin lm composite (TFC) membranes for reverse osmosis (RO) applications.

Zwitterionic structures have attracted a great deal of interest in water treatment membrane preparation because of their high degree of hydrophilicity and antifouling properties. The zwitterionic nature of specially designed and properly incorporated compounds in this technology provides increased membrane hydrophilicity and electrostatic repulsion between the membrane surface and charged contaminants in the feed solution. The combination of these two properties results in a positive effect on membrane ux and salt rejection and also eventually decreases membrane fouling and membrane defects arising from chemical cleaning with chlorine.

### Technology Features And Specifications:

Significant improvements up to 30% in the water flux without loss of salt rejection at seawater desalination conditions were observed in the modified membranes with low SPPT concentrations. Our invention aims do desalinate high salinity seawater at higher recovery rates than the state of the art membranes. These are the most promising features of this invention:

- Higher water flux without loss of the salt rejection
- Decreasing membrane fouling and membrane defects

## Primary Benefits

Potential Applications:

High-performance desalination membranes can be utilized in several areas such as;

- Desalination and wastewater treatment industry
- Chemical industry
- Pharmaceutical industry
- Food industry for the processing of liquid items

Customer Benefits:

- Significant improvements in the performance of TFC membranes will increase the feasibility of desalination technology for drinking water production
- Longer membrane lifetime with a higher salt rejection after repeated cleaning with chlorine

## Development Status

- **Stage of Development** : Prototype
- **Time to Market** : Less than 1 year

## Market & Competition

Improvements of TFC membranes in general and especially for seawater desalination purposes have many contributions to economy, wealth and scientific knowledge. As part of water management strategy, global companies are increasingly employing membrane technologies to improve output efficiency.

The market will grow because of the increase in projects in the municipal sectors of developing economies. The membrane market is dominated by Reverse osmosis membranes with the percentage of %77 in the global market. The reverse osmosis (RO) membrane market is projected to reach USD 5.00 Billion by 2021, projected to grow at a CAGR of 15.75%

### Potential Sectors

Materials  
Manufacturing

### Potential Regions

Turkey  
United States

## Interest In

Looking for licensing partners.

## Hifuk - High Intensity Focused Ultrasound Keratoplasty

**Sector :**Medical

This invention relates to application of ultrasonic waves for ocular imaging and thermal keratoplasty. With this specific technology we offer a device, system and method for performing thermal keratoplasty to be used for the treatment of presbiopic astigmatism and hyperopia and even some cases of irregular optical aberrations by changing the shape of the cornea.

### Description

This specific technology provides a device for thermal keratoplasty comprising a plurality of ultrasonic transducers is focused on a corresponding area of the cornea in order to heat these area and cause collagen shrinkage and at least one of the transducers is capable of receiving ultrasound waves for ocular imaging.

### Primary Benefits

Dual modality saves time and benefits cost performance.

### Development Status

- **Stage of Development :** Prototype
- **Time to Market :** 1-3 year

### Market & Competition

The ophthalmology market is experiencing an impressive growth globally majorly due to tremendous increase in demand for novel diagnostic technological platforms and efficient treatment methodologies.

The global Ophthalmology Devices market was valued at USD26,012.6million in 2012 and estimated to reach a market worth USD40,381.6 million in 2019 at a CAGR of 6.6 % from 2013 to 2019.

#### Potential Sectors

Medical  
Healthcare

#### Potential Regions

Turkey  
EU

### Interest In

This technology may serve for non-invasive refractive corneal surgery, mainly for regressive disorders for the people above 40 years of age, as the surgical treatment can be redone multiple times.

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## Synthetic Models For Surgical Training

**Sector :**Medical

Surgitate produces synthetic tissue and organ models for surgery training. Our products provide a realistic feel of incision, dissection, and suturing. We have breast, skin, and vascular models in our product portfolio and our target customers are surgeons-in-training (e.g., medical and veterinary school students). We also have a self-diagnosis model to be used for breast cancer awareness. We aim to improve the quality of surgical trainings via our practical and tactile simulation platform.

### Description

One in eight women experiences breast cancer at some point in her life. Medically and aesthetically successful surgeries assure the health of these women pre-cancer lives. There are more than ten different types of oncoplastic in these techniques scales with skills of surgeons.

Surgitate fabricates models that surgeons can

- i) cut with scalpel and scissors
- ii) sew
- iii) remove a small/large volume and sew
- iv) feel malign/benign tumors nipple.

This tactile simulation platform will assist surgeons to improve their surgical skills and facilitate their learning process in cooling side at the same time in the same system

### Primary Benefits

Training medical students' and young surgeons' practical skills is essential. The models developed by Surgitate can serve as a platform on which senior doctors can teach junior staff and medical students.

### Development Status

- **Stage of Development :** Pre-Commercial use
- **Time to Market :** 1-3 year

### Market & Competition

Most of the surgical simulation market is based on digital tools and haptic interfaces. Tactile simulation platforms have a potential to offer a more traditional and accessible medium for training.

Four marketing venues to focus on are:

- i) organizers of small conferences and workshops with special focus (e.g., breast cancer)
- ii) large companies that organize or provide to large conferences (e.g., suture companies that market their products with the aid of synthetic models)

- iii) medical schools with simulation laboratories
- iv) individual sales to medical, veterinary, and nursing school students.

**Potential Sectors**

Education  
Healthcare

**Potential Regions**

Turkey  
United States

**Interest In**

There are different types of skin pads, vascular models, and breast models of different sizes to practice a variety of techniques from basic suturing to vascular trauma surgery.

In addition to the breast models for medical training, the company designed an additional self-diagnosis breast model that can be used to teach women how to check their breast for possible lumps.

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## **Mirnas For Diagnosis, Prophylaxis, Treatment And Follow-Up Of Autophagic Diseases**

**Sector** :Pharmaceutical

This novel technology introduces an efficient way to identify the cellular degradation in cellular functions by utilizing specific miRNA families to diagnose existing or potential pathologies enabling fast and efficient diagnosis, prevention and therapy of a wide range of autophagy-related diseases such as cancer, alzheimers, early dementia and hereditary diseases.

### **Description**

This technology involves regulation of the autophagic pathway at multiple levels via a specific miRNA family or its inhibitors.

Therapeutics and diagnostics can be designed around these miRNAs to enable efficient and fast ways to diagnose, prevent or treat diseases arising from excess autophagy by blocking autophagic pathways in cells. Conversely, the diseases occurring because of deficiencies in autophagy can be controlled by suppressing these miRNAs with inhibitors, thereby reinstating autophagic pathways. Mechanistically, miR-376 family of micro RNAs were shown by us to decrease cellular levels of key autophagy proteins Beclin 1 and ATG4.

### **Primary Benefits**

This technology is applicable in the following industries: Pharmaceuticals

This class of miRNAs have potential applications in diagnosis, prophylaxis and treatment of diseases involving autophagic abnormalities such as

- Neurodegenerative and nervous system diseases
- Cancer
- Heart and liver diseases
- Ageing
- Myopathies
- Auto-immune and inflammatory diseases and immune deficiencies
- Infectious diseases
- Ischemic diseases
- Diabetes
- Axonal injury
- Lysosomal storage diseases
- miRNAs are generally more stable than proteins and other forms of RNA, hence are suitable candidates for incorporation into point-of-care diagnostic kits
- miRNAs are organic molecules and natural antisense interactors
- miRNA expression profiles can be used to diagnose disease states as deregulated miRNAs contribute to the initiation and development of diseases
- Many miRNAs are master regulators that modulate many genetic, biological and pathological processes
- Mouse models mimicking human disease show that miRNAs play important roles in various disease progression, hence are good targets for therapeutic development
- Their small size (22-24 nucleotides in length) and organic nature make them very

attractive for drug development.

### **Development Status**

- **Stage of Development** : Concept
- **Time to Market** : More than 5 year

### **Market & Competition**

MicroRNA based research for diagnostics and treatment is a promising emerging field in drug research and several large pharmaceutical companies have already invested substantially into miRNA-related research and therapeutics. (See Melnikova I, Nature Reviews in Drug Discovery 2007).

The total global microRNA market was valued at nearly US\$338.3 million in 2012 and expected to reach US\$763 million in 2017 after increasing at a five-year compound annual growth rate (CAGR) of 17.7%.

Our identification of the “hsa-miR-376” family of miRNAs as potential candidates for drug and diagnostics development is timely to meet the growing demands of this new market segment. RNA therapeutics offer the advantage of low cost synthesis and stability, and as organic molecules that can be targeted specifically are anticipated to have less side effects on patients.

### **Potential Sectors**

Biotechnology  
Pharmaceutical

### **Potential Regions**

United States  
Germany

### **Interest In**



## A Robust Protein Nanomaterial For Pharmaceuticals And Cosmetics

**Sector** :Pharmaceutical

This novel technology offers a robust protein-based nanoparticulate material of controllable size via physical size reduction approach. Common features that a pharmaceutical or a cosmetics must have can be listed as operational stability, bioactivity, bioavailability, operational stability and hydrolytic stability – therefore many efforts are being directed towards the establishment of these features. The developed approach results in enhanced characteristics. The crosslinked proteins that are being offered by this technology have proven to be longer-lived, more easily recoverable, and more stable when compared to the corresponding individual proteins in solution. Therefore, these nanoparticles can replace the role of many solution-phase proteins as well as micron-sized crosslinked protein particles.

### Description

Crosslinked nanosized protein associations have been prepared for very specific applications using only a bottom-up assembly approach. This technology also addresses this issue by describing the preparation of crosslinked protein nanoaggregates. Using readily preparable starting materials conveniently controllable. Hence, large amounts of crosslinked protein nanoparticles can be prepared controllably and conveniently by means of this invention.

### Primary Benefits

Industrially adoptable, easily scalable, and conveniently controllable method

- High bioavailability for pharmaceutical purposes
- Remarkable hydrolytic stability – hence new avenues for absorption into the body
- High bioactivity due to their favorable surface and diffusion/mass-transport characteristics
- Improved operational stability due to the crosslinking effect

### Development Status

- **Stage of Development** : Prototype
- **Time to Market** : 3-5 year

### Market & Competition

Operational stability, bioactivity, bioavailability, operational stability and hydrolytic stability are important features required in pharmaceuticals and cosmetics products. The cross-linked proteins that are being offered by this technology have proven to be longer-lived, more easily recoverable and stable when compared to the corresponding individual proteins in solution.

### Potential Sectors

Biotechnology

### Potential Regions

Turkey

Pharmaceutical

United States

### **Interest In**

This technology is applicable in the following industries:

- Biotechnology;
- Biomedicine
- Pharmacy
- Biomaterial Cosmetics

## **Autonomous Drug Delivery System For Pharmaceutical Drugs**

**Sector** :Pharmaceutical

This technology enables the introduction of a therapeutic substance in the body and improves safety by controlling the rate, time and place of release of drugs in the body.

### **Description**

The purpose of creating this automated device so that it will get reagent inputs and passively mix them together. This novel technology has features of passive reagent mixing with hydrodynamic cavitation, allowing fluid flow due surface tension gradient inside the device due to non-homogenous distribution of nanostructures, effective heating due to enhanced surface area with pin fins, and extracting the drug cocktail from the system. After a heating process, the system transfers ingredients into another chamber in order to adjust and reduce the desired properties of mixture.

### **Primary Benefits**

- Controlling all processes (passive conveying, mixing, heating) in one device
- Much safer due to control of the quantity of reagents and a heating operation
- Gathers the homogenous mixing process of multiple reagents
- Not require any external power source
- Cost effective

### **Development Status**

- **Stage of Development** : Prototype
- **Time to Market** : 1-3 year

### **Market & Competition**

The Micro Electro Mechanical System (MEMS) industry has an exponential growth in today's market. Nowadays, MEMS industry has billions of dollars revenue in the market and is now targeting life sciences and applications. New in vitro diagnostic systems, new therapy strategies, genetic diseases treatment, targeted and intelligent drug delivery, artificial pancreas, drug discovery processes serve for health improvement promised to future generations, which can be accomplished by MEMS technologies. To prevent harmful side-effects and to increase drug's efficiency, MEMS technology could be used to develop autonomous, effective, and compact drug delivery systems. Drug Delivery Technology Market will be worth of \$224.2 Billion by 2017.

### **Potential Sectors**

Medical  
Pharmaceutical

### **Potential Regions**

Turkey  
United States

### **Interest In**

Looking for business partners from Medical field and drug industry.

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## **A Product For Preventing And Recovering Oxidative Damage Living Cells**

**Sector** :Pharmaceutical

Oxidative stress is thought to be involved in the development of many diseases and pathological conditions such as cancer, neurodegenerative diseases, cardiovascular diseases and aging. Quercetin is an antioxidant that belongs to a group of plant pigments called flavonoids that give many fruits, flowers, and vegetables their colors. It scavenges particles in the body known as free radicals, which damage cell membranes, tamper with DNA, and even cause cell death. Antioxidants can neutralize free radicals. Utilizing the antioxidant features of the quercetin by loading it to a nanoparticle to increase the penetration level of the designated active ingredient in to the cell to overcome oxidative stress is the core goal of this technology.

The aim of this technology is to maximize the antioxidant effect of quercetin for prevention or recovery of the oxidative stress in living cells. Another aim is to improve quercetin penetration into cells.

### **Description**

With this novel technology, quercetin is used as an antioxidant using TiO<sub>2</sub> nanoparticles as a delivery vehicle for effective prevention and recovery of oxidative damage in living cells. Using TiO<sub>2</sub> nanoparticle increases quercetin penetration to the cell moreover its high biosafety, antibacterial and inert properties features allows for safe consumption. The encapsulated TiO<sub>2</sub> nanoparticle undergoes surface modification before loading quercetin. Therefore, the loading efficiency of the quercetin increases because the nanoparticle has a more adhesive surface and loading capacity is also increased. Binding quercetin to TiO<sub>2</sub> nanoparticle help to maintain the high concentration, stability and functionality without any cytotoxicity in cell and by this way it is able to show a strong antioxidant activity against to ROS.

TiO<sub>2</sub> nanoparticle as a delivery platform is approved by FDA as it is a biological inert component. It has been widely used in sunscreen products as a major active component against high ultraviolet rays in cosmetics due to its highly efficient photoactive properties. Quercetin loaded TiO<sub>2</sub> nanoparticles can be utilized in several areas and products such as;

- Dermocosmetics; anti-aging skin care, wound healing, sun care.
- Medicine; chemotherapeutics in oncology, remedy of skin disorder such as psoriasis or atopic dermatitis in dermatology, as an anti-inflammatory in autoimmune and cardiovascular diseases
- Pharmacy; antioxidant supplementary

### **Primary Benefits**

- Ensure safety against to toxicity
- More capacity for loading quercetin

### **Development Status**

- **Stage of Development** : Proof of Concept
- **Time to Market** : 1-3 year

### **Market & Competition**

Global demand for the anti-aging market was valued at USD 140.3 billion in 2015, is expected to reach USD 216.52 billion in 2021 and is anticipated to grow at a CAGR of 7.5% between 2016 and 2021.

Anti-aging formulas and products are witnessing higher consumer penetration in countries having a majority of generation x and baby boomers population. Modern lifestyle is defined by the combination of appearance and sophistication. Individuals are more conscious about their looks, the trend is especially visible amongst the urbanites. Moreover, an ever-increasing size of the aging populace across the globe has further fueled the demand for anti-aging products.

#### **Potential Sectors**

Pharmaceutical  
Nanotech

#### **Potential Regions**

EU  
United States

### **Interest In**

Looking for licensing options.

## Higher Order Tensor Based Vasculature Modeling

**Sector :**Techniques

This invention presents a new method for extracting a whole vessel tree using Higher Order Tensor (HOT) flux-based tractography idea. This method offers seamless modeling of the n-furcations jointly with tubular sections within the same space mathematical model.

### Description

Extraction of vascular structures such as coronary and cerebral arteries is an important step in detection and analysis of vessel anomalies and pathologies such as aneurysms, stenosis and plaques. This novel technology brings a new solution that using computer algorithms to extract patient-specific vasculature models using patient's own medical imaging data (Computed tomography, MRI etc) are needed. The problem of patient-specific vascular tree modeling an initial segmentation step that produces a 3D segmented volume has to be followed by an external mesh construction scheme to model n-furcated vessels for mesh editing and further modeling.

First novelty of this technology extracts the vascular surface together with modeling of the n-furcation of the vessel.

Second distinctness is the introduction of asymmetry into the higher-order tensor modeling by carrying the space from 3-Dimensions to 4-Dimensions. These features provide well-fit to problem of n-furcation modeling in the vessel.

### Primary Benefits

- Increased efficiency for analyzing their patient's data
- More accurate models of patient vasculature
- Faster than previous technologies, only few seconds to extract the whole vascular tree
- Low cost stand-alone software

### Development Status

- **Stage of Development :** Prototype
- **Time to Market :** 1-3 year

### Market & Competition

According to the National Institute of Mental Health in the U.S. about 1 in 4 adults suffer from brain disorders every year, with almost 6% of the population suffer from serious disabilities. Thus, for the diagnosis of these disorders rapidly new tools are being developed for more patients centered and personalized treatment. In the near future Asia-Pacific region is expected to witness significant growth to meet the massive unmet need for early diagnosis and disease monitoring.

Factors such as increase in geriatric population, investment in R&D and improved understanding of the nature of neurologic diseases are driving the market growth globally. Since, aged population is more prone to brain disorders therefore; increase in geriatric population will likely increase the neurodiagnostics market worldwide. Additionally, as per the World Health Organization, by 2020 nearly 14.1% of the world population will suffer from neurologic disorders, which would further lure manufacturers to venture into this market.

**Potential Sectors**

Medical  
Healthcare

**Potential Regions**

Turkey  
United States

**Interest In**

- Stand-alone usage by doctors for visualizing and examining patient's vascular structure
- Usage by medical laboratories for analysis of patient vascular data
- Making measurements for monitoring health of vascular structures such as; coronary arteries, cerebral arteries or veins for a patient
- Detecting pathologies in the vascularate stenosis in coronaries or cerebral aneurysms in cerebral vascularate