TECHNOLOGIES FOR LICENSING

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THE Bangalore Biocluster

2015

Bangalore Biocluster ia a hub for world-class fundamental research, state-of-the-art high-end technology platforms and for the development of innovative technologies in the bioscience field.

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Technologies available for licensing are described within this brochure. For further discussion on the technologies with our team please contact:

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THE AIM OF THE CENTRE FOR CELLULAR AND MOLECULAR PLATFORMS (C-CAMP) AS PART OF THE BANGALORE BIOCLUSTER IS TO CONNECT INDUSTRY WITH NCBS AND INSTEM RESEARCHERS AND PROMOTE THE COMMERCIALIZATION OF INVENTIONS FROM THE CLUSTER THROUGH LICENSING AGREEMENTS WITH COMPANIES

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FROM CONCEPT TO PRODUCT

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1 Microfluidic Device for Long Term *In-vivo* Imaging Throughout Development of Transparent Organisms

The Novel Technology:

To study developmental and cell biological phenomena occurring over longer time scales, it is often very useful to follow a single identified animal throughout its life cycle. Examples include cell migration, axon outgrowth, synapse remodeling and organelle dynamics. We have developed a simple growth and imaging PDMS device with food flow to track an individual *C.elegans* from the time of its hatching to adulthood.

Applications:

- To study developmental and track physiological changes in translucent organisms
- To use in other experiments – laser ablation, live transport imaging, behavioural analysis, calcium cell body imaging, cell division, migration, etc.,

Advantages of the Technology:

- Complete immobilization of organisms without any glue or anesthesia
- No change in normal health condition of organism
- Multiple point of observation for days to monitor long term cellular and sub-cellular processes.
- No effect on the physiological process of the organism
- Simple device design without any requirement for expensive alignment process

Business Model:

Early-stage technology demonstrating immobilization without the use of anesthetics, provides a feeding mechanism, allows growth of the organism within the microfluidic device and is coupled to sub-cellular imaging which gives the added ability to visualize neuron movement within organism. Looking for potential licensee(s) for further development of the technology.

Principal Investigator(s): **Dr. Sandhya P. Koushika, NCBS**

Invention ID: CMP-007

IP Status: Patent Pending

Jurisdictions: India (IN)

For more details, please write to:
techtransfer [at] ccamp.res.in

2 A Process for Delivering Encapsulated Neutral Bioimaging Molecules, Complex and Process thereof

The Novel Technology:

The present disclosure relates to encapsulation of functional biomolecules inside icosahedral DNA capsules for *in vivo* delivery. The present disclosure also discloses the entrapment of a functional biomolecules like FITC dextran within the cavity of a DNA polyhedron without any molecular recognition or chemical conjugation between host (DNA icosahedron) and cargo (FITC Dextran). This DNA polyhedron is structurally well defined and shows high encapsulation efficiency.

Applications:

- To target molecules to various sites in living organisms by changing the surface properties of DNA and conjugating it to various tags like folate
- To study the functional behaviour of encapsulated molecules in confined environments or as target specific delivery agents for functional drugs
- To precisely position functional molecules on the surface of DNA icosahedron
- To encapsulate various functional molecules in the DNA nanocapsules

Advantages:

This novel method is superior to current encapsulating scaffolds because:

- It is not limited to molecules that need to undergo molecular recognition with the host scaffold
- Larger varieties of molecules may be encapsulated provided they have a size compatibility with the polyhedron
- The size of the polyhedron can also be easily altered to encapsulate differently sized molecules
- Guest molecules do not need to undergo a chemical reaction for encapsulation and the DNA scaffold is amenable to site specific chemical modifications using multiple orthogonal chemistries.

Business Model:

Early-stage technology with proof of concept showing the entrapment of a functional biomolecule like FITC dextran within the cavity of a DNA polyhedron without any molecular recognition or chemical conjugation between host (DNA icosahedron) and cargo (FITC Dextran). This DNA polyhedron is structurally well defined and shows high encapsulation efficiency. Looking for potential licensee(s) to take the technology to next stage of development.

Principal Investigator(s): **Dr. Yamuna Krishnan, NCBS**

Invention ID: CMP-012

IP Status: Patent Pending

Jurisdictions: India (IN), United States (US), Europe (EP)

For more details, please write to:
techtransfer [at] ccamp.res.in

3 A Microfluidic-based Flow Analyzer

The Novel Technology:

The invention discloses a microfluidic flow analyzer. In particular, the technology is an evaluative technology for various diseases primarily for immune response monitoring through CD4/CD8 cell counting in HIV/AIDS at point-of-care locations.

Applications:

- To use in AIDS health monitoring
- To use in cell culture assays
- To use in detection of water contamination
- To use blood cell count, stem cells, oncological tests, etc

Advantages:

- Lower device cost
- Lower sample running cost
- Higher portability for non-conventional environments
- Ability to run the device on battery power
- Volume of samples required is low
- Minimal technical knowledge required to use the device
- Ease of maintenance
- Ease of modification and upgradability

Business Model:

The technology is at an early stage of development. A basic proof-of-concept has been developed. The technology is now being tested on human cells. Currently looking for industrial partners to take the technology further and commercialize.

Principal Investigator(s): **Dr. Taslimarif Saiyed, CCAMP and Dr. Anil Prabhakar, IIT-Madras**

Invention ID: CMP-015

IP Status: Patent Pending

Jurisdictions: India (IN), United States (US), Europe (EP), China (CN), Korea (KR), Japan (JP), Nigeria (NG), Vietnam (VN), South Africa (ZA), Eurasia, ARIPO

For more details, please write to:
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4 Mouthwash for Oral Mucositis based on various Plant Extracts

The Novel Technology:

This invention describes a method to obtain a novel herbal mouthwash made from various plant parts– *Emblica officinalis*, *Terminalia chebula*, *Terminalia bellerica*, *Glycyrrhiza glabra* and *Azadiracta indica*. Also, it presents the mouthwash composition that helps in delaying the onset of oral mucositis in cancer patients undergoing radiotherapy.

Applications:

- To delay the development of oral mucositis in the initial phase of radiotherapy
- To minimize symptoms and signs of mucositis
- To controls existing oral mucositis in patient undergoing radiotherapy
- To get better oral hygiene

Advantages:

- Very cost-efficient compared to costs of other available agents
- Acts as good analgesic, antibacterial, anti-inflammatory and mucolytic agent
- Reduces the costs associated with pain management, antibiotic use, liquid diet supplements, gastrostomy tube placement and hospitalization

Business Model:

Mid-stage technology with clinical trials demonstrating efficacy of mouthwash reducing radiation induced mucositis for patients undergoing Radiotherapy for Head & Neck cancer.

Principal Investigator(s): **Divya Ravindran, Ravikumar Regnish Kumar, Dr. Kunnambath Ramadas, RCC and Dr. Madhavan Radhakrishna Pillai, RGCB**

Invention ID: CMP-011

IP Status: Patent Pending

Jurisdictions: India (IN), United States (US)

For more details, please write to:
techtransfer [at] ccamp.res.in

5 Aegle Marmelos Fruit based extract for *Mycobacterium tuberculosis*

The Novel Technology:

An extract of Aegle marmelos (Bael) fruit with cytotoxic effect against *Mycobacterium tuberculosis*

Applications:

- To use the extract as an anti-TB formulation
- To develop potential lead molecules from the identified compounds for therapeutic use against *Mycobacterium tuberculosis*

Advantages of the Technology:

- Easy to obtain extract from natural source than a synthetic sources
- Extraction time is less compared to other methods
- Efficient system helps in obtaining higher yield

Business Model:

Early stage technology. Proof of concept by fractionation yielded a pure compound and demonstrated that hexane extract showed activity against *Mycobacterium tuberculosis*.

Principal Investigator(s): **Dr. Ajay Kumar, RGCB**

Invention ID: CMP-009

IP Status: Patent Pending

Jurisdictions: India (IN)

For more details, please write to:
techtransfer [at] ccamp.res.in

6 *Wrightia tinctoria* Leaf Extracts to Treat Cancer

The Novel Technology:

The invention discloses extracts having potential anticancer activity and the process of preparing extracts from the plant – *Wrightia tinctoria*. The anticancer activity of the extract shows maximum cytotoxicity against skin cancer as well as substantial cytotoxicity towards cervical and lung cancer cell lines.

Applications:

- To induce apoptosis in cancer cells (particularly skin, cervical and lung cancer)

Advantages:

- Targets only cancer cells (no cell death in normal cells) and extract can be used as safe and natural chemotherapeutic agent
- Helps in reducing cost of chemotherapy
- Anticancer compounds from extract may be identified further from *Wrightia tinctoria* leaf extract to identify active ingredient and for formulation of specific drug molecule

Business Model:

Early-stage technology demonstrating anticancer properties in leaf extract of *Wrightia tinctoria*. Looking for potential licensee(s) for taking the technology to next stage.

Principal Investigator(s): **Dr. Ruby John Anto, RGCB**

Invention ID: CMP-010

IP Status: Patent Pending

Jurisdictions: India (IN)

For more details, please write to:
techtransfer [at] ccamp.res.in

7 Nucleic Acid Assembly, Vector, Cell, Methods and Kit thereof

The Novel Technology:

A novel technology based on label free endocytic delivery of DNA sensors to map spatiotemporal dynamics of small diffusible molecules within living biological systems. These molecules would include, but are not limited to ions, chemical messengers, small organic molecules, second messengers, hormones, as well as metabolites, enzymes, neurotransmitters, proteins, cyclic nucleotides, lipids, phospholipases, biological cofactors, drugs, antibiotics, nucleic acids and their derivatives.

Applications:

- To act as a high precision chemical sensor
- To act as an intracellular delivery agent
- To act as *In vivo* targeting agent
- To study dynamics of diffusible small molecules during cell function
- To use as label-free technique for bioanalysis of specific DNA sequence

Advantages:

- Construction of the sensor is easy, as one can just anneal two DNA strand to make a working sensor for any pathway whereas other method like BAC dextran which is a chloride sensor needs conjugation and purification to a number of ligands in order to study multiple pathways
- As this technology use FRET/ratiometric fluorescence as a readout, one can engineer different FRET pair positioned in the different DNA strands to optimize sensitivity and efficiency which is not possible for protein based sensors such as EPAC where the positioning and orientation of fluorescent proteins are prefixed
- Superior to other methods as it can precisely localize functional DNA-nanostructures in cellulo and in vivo by simply incorporating an artificial DNA-protein pair of an 8 bp sequence and recombinant antibody

This method is generalizable to the chemical diversity of sensing of possible by both DNA and RNA scaffolds as aptamers are readily available against a wide variety of targets such as metabolites, drugs and their derivatives, amino acids, nucleotides and its derivatives, biological cofactors, antibiotics, vitamins, proteins, small peptides, toxins etc.

Business Model: Early-stage technology with proof of concept showing the targeted delivery of nucleic acid-based pH sensor to map the endocytic pathway in HeLa cells.

Principal Investigator(s): **Dr. Yamuna Krishnan, NCBS**

Invention ID: CMP-014

IP Status: Patent Pending

Jurisdictions: India (IN), United States (US), Europe (EP)

For more details, please write to: techtransfer [at] ccamp.res.in

8 Intracellular pH Sensor using Nucleic Acid Assemblies

The Novel Technology:

This technology involves the construction of a DNA nanomachine triggered by protons, called the I-switch, that functions as a Fluorescence Resonance Energy Transfer (FRET) based pH sensor inside living cells. It is an efficient reporter of pH from 5.5 to 7.

Applications:

- To use as a high performance reporter of spatio-temporal pH changes associated with viral infections, phagocytosis, chemotaxis, apoptosis and defective acidification in tumor cells
- To track synaptic vesicles and endocytic traffic in cells and living organisms
- To target the sensor to particular cell types, sites within a cell or organelles by attaching nucleic acid or protein tags to the sensor
- To study crosstalk in complex intracellular sorting or trafficking events

Advantages:

- Non-toxic byproducts (water & salt) of a complete cycle for the DNA sensor
- Since it is a FRET based, it is equally bright at both physiological and acidic pH, photostable and offers the advantages of a ratiometric probe
- Simultaneous follow of multiple proteins with each protein bearing a sensor with a distinct FRET pair
- Enables favourable comparison with other molecular scaffolds used to measure pH 5-7 inside living cells

Business Model:

The technology is at an early stage of development with the sensor having been validated *in vitro*. Looking for potential licensee(s) for taking the technology to next stage of development.

Principal Investigator(s): **Dr. Yamuna Krishnan, NCBS**

Invention ID: CMP-018

IP Status: Patent Pending

Jurisdictions: United States (US)

For more details, please write to:
techtransfer [at] ccamp.res.in

9 DNA based Molecular Switches and Uses thereof

The Novel Technology:

This invention describes a mechanism to hybridize two DNA strands together using a pH trigger. At acidic pH certain Adenine rich sequences can hybridize by forming a parallel duplex. At neutral pH this mode of association is no longer operational and the two strands fall apart. This could be a way to 'switch on and off' DNA base pairing using a pH trigger.

Applications:

- To use pH switchable 1D, 2D and 3D assemblies in DNA based computation strategies as logic gates
- To use 3D DNA polyhedra as targetable drug delivery agents
- To use A-motif based nano-machines to measure pH in late endosomes or lysosomes
- To use in designing novel biosensors

Advantages:

- Highly stable
- Very fast switching mechanism in response to pH (in milliseconds)

Business Model:

The technology is in early stage of development. Looking for potential licensee(s) for further development of the technology.

Principal Investigator(s): **Dr. Yamuna Krishnan, NCBS**

Invention ID: CMP-019

IP Status: US Patent Granted

Jurisdictions: United States (US)

For more details, please write to:
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10 DNA Nanocapsules and Methods for Modular Assembly

The Novel Technology:

The novel technology describes nucleic acid nanostructures and methods for making the same. It includes a modular assembly method of forming DNA nanocapsules. These DNA icosahedral 'nanocapsules' are used to successfully encapsulate various substances like label (gold particles) and target moiety (peptide nucleic acids, aptamers)

Applications:

- To use nanocapsules to encapsulate agents (therapeutic and imaging agents) for drug delivery
- To create DNA-protein complexes to mimic viruses and exploit viral entry pathways into cells for delivery of proteins and/or nucleic acids

Advantages:

- The DNA nanocapsules described here are resistant to nuclease digestion, proving that they are completely ligated and do not have exposed ends
- DNA nanocapsules have the ability to encapsulate gold nanoparticles, proving that they are functional and can be used for encapsulating other relevant molecules such as drugs, peptides, proteins or nucleic acids
- Enhances stability of DNA icosahedral nanocapsules
- Very large number of identical assemblies could be fabricated simultaneously
- Enables manufacture of complex nanocapsules by adding functional groups at any desired position

Business Model:

The technology is at an early stage with proof-of-concept demonstrating encapsulation of gold particles with the DNA icosahedral structure. Looking for potential licensee(s) to take the technology to the next development stage.

Principal Investigator(s): **Dr. Yamuna Krishnan, NCBS**

Invention ID: CMP-020

IP Status: Patent Pending

Jurisdictions: United States (US)

For more details, please write to:
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11 Store-operated Calcium Cellular Assay for Screening Molecules

The Novel Technology:

The present technology provides a cell-based assay for identifying a compound that modulates store-operated, intracellular calcium levels in a cell using inositol 1,4,5-trisphosphate receptor (itpr) mutant cell lines which have abnormal levels of ionic calcium.

Applications:

- To screen drugs which can alter intracellular calcium levels
- To identify drugs that could be of therapeutic value in diseases such as Alzheimer's, Severe Combined Immuno Deficiency (SCID), Dariers' Diseases (DAR), acute pancreatitis (AP), Spino-Cerebellar Ataxias (SCA)

Advantages:

- Rapid screen for potential drug candidates for therapeutic uses
- Cells have modulated calcium ion release upon stimulation

Business Model:

The technology is currently at an early stage with proof of concept demonstrated in a laboratory environment. Looking for potential licensee(s) for further development of the technology.

Principal Investigator(s): **Dr. Gaiti Hasan, NCBS**

Invention ID: CMP-021

IP Status: US Patent Granted

Jurisdictions: United States (US)

For more details, please write to:
techtransfer [at] ccamp.res.in

12 Method of Determining Effect of Anti-Obesity Molecule

The Novel Technology:

The invention discloses a method of determining the anti-obesity effect of a molecule, using mutant Drosophila strains. Moreover, the invention is useful for testing drugs developed to reduce appetite, reduce fatty acid uptake from the intestine and reduce excess fat deposits.

Applications:

- To test for drugs that reduces excess triglyceride deposits by:
  - Altering lipid absorption in the intestine and its effects on fat storage tissues
  - Altering appetite levels and in turn reduction of weight

Advantages:

- Very cost-efficient means for initial testing of drugs
- Allows for testing toxicity levels of the drug simultaneously by measuring other parameters like activity of the animals post drug ingestion
- Comparable with human conditions of genetic tendency for weight gain with a normal diet

Business Model:

The technology is at early-stage of development. Initial studies have been done using the anti-obesity compounds available in the market. Looking for partners to further develop and commercialize the technology.

Principal Investigator(s): **Dr. Gaiti Hasan, NCBS**

Invention ID: CMP-016

IP Status: Patent Pending

Jurisdictions: PCT filed

For more details, please write to:
techtransfer [at] ccamp.res.in

13 A Method to Inhibit NF-kB and Managing Hemophilia

The Novel Technology:

This novel method allows the identification of the molecular regulators that are triggering blood induced joint damage in severe hemophilia.

Applications:

- To obtain novel information on patho-biology of joint damage in one of the common genetic disorders, hemophilia A
- To identify novel NF-kB or dependent targets to intervene with the development of synovitis and arthropathy in hemophilia

Advantages:

- Specifically targets inflammatory or chondro-degenerative processes in the joints by blocking local activation of NF-κB using either shRNA directed against NF-κB or delivering anti-inflammatory targets using a NF-κB responsive promoter system.
- Wide application in both haemophilia A and haemophilia B (in case of NF-kB dependent joint damage causing joint destruction)

Business Model:

The technology is at an early-stage of development with data showing that distinct members of the NF-κB (NF-κB1, NF-κB2, RelA, RelB), NF-κB -responsive inflammatory cytokine genes (IL-1b, IL-6, IFNg), HIF-1a, VEGF-1 and matrix metalloproteinase-13 are significantly (>2 fold) up-regulated in hemarthrotic Vs control joints. Looking for potential licensee(s) for further development of the technology.

Principal Investigator(s): **Dr. Jayandharan, CMC**

Invention ID: CMP-024

IP Status: Patent Pending

Jurisdictions: India (IN)

For more details, please write to:
techtransfer [at] ccamp.res.in

14 Recombinant Adeno-Associated Virus (AAV) Vector Capsid for Efficient Gene Therapy

The Novel Technology:

The technology relates to recombinant adeno-associated virus (AAV) vector serotype, wherein the capsid protein of AAV serotypes is mutated at single or multiple sites. Further, this technology relates to an improved transduction efficiency of mutant AAV serotypes (AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, AAV9 and AAAV10).

Applications:

- To use novel AAV vectors in clinical trials
- To use novel vectors to improve gene delivery for many human diseases in pre-clinical or clinical trials for gene therapy (eg: AAV3-liver target diseases, AAV8-hemophilia)

Advantages:

- Increased transduction efficiency from the novel AAV mutant vectors translates into enhanced therapeutic benefit in patients undergoing AAV-mediated gene-therapy
- Broader applicability in the gene therapy field for various diseases
- Lower cost of gene therapy due to administration of low doses of vectors
- Promotion of safety of the AAV vectors by limited dose-dependent immune-toxicity seen with conventional WT-AAV vectors

Business Model:

The technology is at early-stage with proof-of-concept in-vivo studies in mice showing increase in transduction efficiency of mutant AAV serotypes. Looking for industrial partners or licensee(s) for taking the technology further.

Principal Investigator(s): **Dr. Jayandharan, CMC**

Invention ID: CMP-022

IP Status: Patent Pending

Jurisdictions: India (IN)

For more details, please write to:
techtransfer [at] ccamp.res.in

15 Method of Preparation of Human Induced Pluripotent Stem Cells (iPSC)

The Novel Technology:

A novel method to prepare iPS cells using an Adeno Associated Virus (AAV) -based vector to reprogram human somatic cells followed by site-specific integration of the reprogramming factor at AAVS 1 locus to generate human iPS cells. Reprogrammed cells can be fully selected using a selection tool and removed from iPSC by Cre-loxP design. Additionally this invention allows for effective removal of AAV vector from the site of integration after reprogramming of the somatic cells.

Applications:

- To study the development and course of different diseases of diseased patients and forming specific cell types (neurons, heart muscle, liver or pancreas cells)
- To generate integration-free induced pluripotent stem cells by reprogramming somatic cells
- To make site-specific integration of therapeutic transgenes/Reporter genes in AAVS1 locus on human genome and integration of oncogenic genes to derive iPS cell lines from primary culture cells
- To discover new drugs or treat medical conditions through cell therapies
- To test drug efficacies in the generated iPS cells

Advantages:

- Precise production of virus-free and integration-free iPS cells
- More reliable and consistant method
- Higher yield of iPS cells than compared to existing method
- Site-specific integration of AAV vector cassette

Business Model:

This invention is in early stage of development. Looking for potential licensee(s) interested in taking the technology to next step of development.

Principal Investigator(s): **Dr. Sanjay Kumar, CMC**

Invention ID: CMP-030

IP status: Patent Pending

Jurisdictions: India (IN)

For more details, please write to:
techtransfer [at] ccamp.res.in

16 Optimized Coconut Water for Growth of Microbes and Expression of Recombinant Proteins and Methods thereof

The Novel Technology:

This technology describes a simple and cost effective modification of Tender Coconut Water (TCW) media to function as complete media without expensive animal protein supplementation. This novel media enables uniform growth, high production of biomass and over expression of recombinant proteins in *E.coli* and *Pichia*.

Applications:

- To facilitate growth of prokaryote and eukaryote microorganisms and expression of recombinant proteins with the normalized growth media
- To use as an inducer based auto-induction media
- To potentially increase biofuel production
- To provide a rich source of long chain fatty acids which can be bioconverted using recombinant lipases into compounds having pharmaceutical and nutraceutical significance and other proteins expression for bioconversion purpose.

Advantages:

- Increased biomass of bacteria and yeast
- Cost efficient and normalized growth media
- Green alternative to animal based protein products and other standard media (eg. Luria broth)

Business Model:

This invention is in early stage of development. Looking for potential licensee(s) interested in taking the technology to next step of development.

Principal Investigator(s): **Dr. Muniasamy Neerathilingam, C-CAMP**

Invention ID: CMP-031

IP status: Patent Pending

Jurisdictions: PCT filed

For more details, please write to:
techtransfer [at] ccamp.res.in

17 Dendrimers, Conjugates and Methods thereof

The Novel Technology:

This technology describes synthesis of two dendrimers - a) second generation methoxy PEG dendrimer [mPEG(G2)(Cl)4] with four active chloride groups on the periphery and methoxy PEG as the core and b) second generation acetal PEG dendrimer [acetal[PEG(G2)(Cl)8] with eight active chloride groups on the periphery and 3,3-diethoxy-1,2-propanediol as the core. Further, in the intermediate generations, hydroxyl groups are present on the periphery that could be used for conjugation of the bioactive molecules. These hydroxyl groups can also be modified to other functional groups according to the need.

Applications:

- To use for effective cancer therapy through efficient active molecule delivery
- To have potential use in Drug delivery through conjugation of active bio molecules

Advantages:

- Conjugating dendrimers and bioactive molecules to increase therapeutic efficacy and delivery of bioactive molecules
- Less cytotoxicity towards healthy cells

Business Model:

This invention is in early stage of development. Experiments using other bioactive molecules are to be conducted. Looking for potential licensee(s) interested in taking the technology to next step of development.

Principal Investigator(s): **Prof. M. A. Vijiyalakhsmi, CBST**

Invention ID: CMP-025

IP status: Patent Pending

Jurisdictions: India (IN), United States (US)

For more details, please write to:
techtransfer [at] ccamp.res.in

18 A Method to Identify and Isolate Pluripotent Stem Cells using Endogenous Blue Fluorescence

The Novel Technology:

This invention uses blue autofluorescence of the fat bodies of Human Embryonic Stem cells (hES) and Human Induced Pluripotent Stem cells (hiPS) as an endogenous marker to allow both identification and mechanical isolation of human pluripotent cells. Cells with higher blue auto-fluorescence can also be separated easily and reliably from the non-pluripotent population as single cells.

Applications:

- To use for identifying and isolating human pluripotent stem cells from their differentiated counterparts rapidly and efficiently without modifying the cells
- To use for both small and large scale cultures equally well
- To monitor/quantitate/assay efficiency of conversion of various somatic cell types toward pluripotency under different experimental conditions
- To remove undifferentiated teratoma forming cells
- To lend itself to high-throughput assays to monitor differentiation/loss of pluripotency and analyse the biochemical process involved
- To use for isolating and getting both mouse and human pluripotent cells

Advantages:

- Label –free method to identify human pluripotent stem cells
- Useful for High-Throughput identification
- Single cell isolation possible
- Can use normal 405 laser and conventional flow cytometry/microscopy for detection of blue auto fluorescence
- Possible to determine the stage of differentiation e.g. efficiency of reprogramming
- Levels of endogenous fluorescence is quantifiable
- Cost effective method to identify and isolate hiPS, hES and somatic/differentiated cells.

Business Model:

Proof-of-concept has been demonstrated. Currently, looking for potential licensee(s) interested in taking the technology to next stage of development.

Principal Investigator(s): **Prof. Mitradas M. Panicker, NCBS**

Invention ID: CMP-028

IP status: Patent Pending

Jurisdictions: United States (US), Europe (EP)

For more details, please write to:
techtransfer [at] ccamp.res.in

19 Method of Multiplexing DNA Sensors, Localizing DNA Sensor and obtaining FRET Pair

The Novel Technology:

The technology discloses programmable multiple DNA sensors that maps pH change inside the same living cell for the first time. These DNA sensors are non-interfering to the cell and to each other and function autonomously within the cellular environment. These DNA nanomachines are programmed suitably depending on the relevant organelle such that they function as Fluorescent Resonance Energy Transfer (FRET) based pH sensors.

Applications:

- To simultaneously map pH in two different organelles namely Golgi and Endosome.
- To study cellular pathways and trafficking events *in cellulo* by monitoring the pH gradients of each pathway
- To study cellular events that may be linked between two organelles

Advantages:

- Simultaneous track of two proteins and their distinct environments by using two DNA sensors
- Enables mapping of intersecting endocytic pathways
- Precise positioning of more than one DNA nanodevice within subcellular environments

Business Model:

This invention is in early stage of development. Looking for potential licensee(s) interested in taking the technology to the next development stage.

Principal Investigator(s): **Dr. Yamuna Krishnan, NCBS**

Invention ID: CMP- 032

IP Status: Patent pending

Jurisdictions: PCT filed

For more details, please write to:
techtransfer [at] ccamp.res.in

20 Double Mutant Coagulation Factor VIII and Methods therof

The Novel Technology:

The technology relates to the production of more active and stable recombinant B-domain deleted (BDD) Factor VIII protein. Specifically, double mutant BDD Factor VIII with combined mutations of Phe309Ser and Asp519Val has been generated.

Applications:

- To use in the field of haemophilia therapeutics
- To improve efficacy of recombinant Factor VIII molecule
- To get good specific activity for present needs comparable to existing products

Advantages:

- No foreign sequences included and hence lower risk
- Double mutant recombinant Factor VIII results in higher secretion, enhanced activity and stability compared to the wild type BDD Factor VIII
- Fewer steps and more efficient steps ensuring good recovery of intact Factor VIII without pre-activation

Business Model:

This invention is in early stage of development. Looking for potential licensee(s) interested in taking the technology to next step of development. There is a high possibility of approaching funding agencies for any financial need for furthering the development.

Principal Investigator(s): **Prof. M. A. Vijiyalakhsmi, CBST**

Invention ID: CMP-026

IP status: Patent Pending

Jurisdictions: India (IN), PCT filed

For more details, please write to:
techtransfer [at] ccamp.res.in

21 Methods for Producing Recombinant Peptides and Protein from Non-Filamentous Fungi and Recombinant Host Cell thereof

The Novel Technology:

Novel technology describes the method for production of recombinant B-Domain Deleted (BDD) Factor VIII using *Pichia pastoris* expression system. Further, it describes a process to produce a functional recombinant Factor VIII by expressing separately and reconstituting heavy and light chain using the same system.

Applications:

- To express heavy and light chain of Factor VIII in *Pichia pastoris* expression system and purify and reconstitute obtaining therapeutic FVIII
- To have independent use of heavy and light chain for other purposes than hemophilia treatment

Advantages:

- Easy handling and safe
- Reduced risk of immune rejection through glycosylation mechanism
- Ability to grow to high cell densities and enhances the production level
- Facilitates purification and imposes huge advantage for industrial production
- Secretes low amounts of host proteins makes purification of target protein easier

Business Model:

This invention is in early stage of development. Looking for potential licensee(s) interested in taking the technology to next step of development.

Principal Investigator(s): **Prof. M. A. Vijiyalakhsmi, CBST**

Invention ID: CMP-027

IP status: Patent Pending

Jurisdictions: India (IN), PCT filed

For more details, please write to:
techtransfer [at] ccamp.res.in

22 Monolith-based Pseudo-Bioaffinity Purification Methods for Factor VIII from Various Sources and Applications thereof

The Novel Technology:

The novel technology relates to the purification of Factor VIII protein and/or its fragments from various sources by employing various pseudobioaffinity based purification methods (Histidine Ligand Affinity Chromatography –HLAC coupled with monolith-based Convective Interaction Media – CIM.

Applications:

- To use for the purification of:
  - native factor VIII from plasma cryoprecipitate,
  - recombinant B-domain deleted factor VIII:C expressed in various host systems,
  - recombinant factor VIII mutant having improved activity and stability, and
  - recombinant FVIII expressed in *Pichia pastoris*

Advantages:

- No column packing or clogging problem
- Flow independent specific binding
- Mild elusion avoids any denaturation process of the target protein
- Minimal processing time and high throughput steps in comparison to classical affinity-based purification techniques to recover Factor VIII:C
- Purified without any significant loss of activity
- Increase in recovery yield and increase in purity

Business Model:

The technology is in early stage of development. Looking for potential licensee(s) interested in taking the technology to next step of development. There is a possibility of getting FDA approval and supply of chromatographic system by the producer.

Principal Investigator(s): **Prof. M. A. Vijiyalakhsmi, CBST**

Invention ID: CMP-029

IP status: Patent Pending

Jurisdictions: India (IN), United States (US), Europe (EP)

For more details, please write to:
techtransfer [at] ccamp.res.in

23 A Process of Labelling Stem Cells and a Method of Tracking thereof

The Novel Technology:

The novel technology relates to a method of labeling stem cells (using a fluorescent dye) for real-time *in vivo* tracking of cells during and after cell transplantation that can be successfully employed in various pre-clinical and clinical applications.

Applications:

- To track cells *in vivo* during and after cell transplantation
- To use in various basic research, clinical/pre-clinical applications

Advantages:

- Robust & optimized protocol for ICG labeling of stem cells
- Enables longer duration of tracking the labeled cells
- Safe and non-cytotoxic labeling
- Efficient tracking of transplanted cells

Business Model:

Proof-of-concept study on mice model demonstrated efficacy of cell tracking. Currently, undergoing trials under clinical settings to test efficacy of this technology. Looking for collaborative industrial partners for further development and commercialization of the technology.

Principal Investigator(s): **Dr. Sanjay Kumar, CMC**

Invention ID: CMP-034

IP Status: Patent Pending

Jurisdictions: India (IN)

For more details, please write to:
techtransfer [at] ccamp.res.in

24 A Method of Obtaining Vector and Transformed Cell

The Novel Technology:

Novel technology describes vector and enzyme free cloning strategy that results in customization of plasmids (>6000combinations) harbouring desired gene of interest (GOI). DNA fragments containing antibiotic resistant markers, promoters, origins of replication, fusion tags etc and desired GOI can be transformed directly into expression host systems without using any vectors and enzymes (No -T4ligase, T4 DNA polymerase and restriction digestion enzymes). Upon expression of colonies, the highest expressing clone can be identified and minipreped.

Applications:

- To get custom plasmids
- To deliver traits to a host cell without any involvement of vector or enzyme
- To express proteins *in-vivo*
- To shuttle the generated plasmids to other host systems (yeast, mammalian cells, cell free systems, insect cells)

Advantages:

- No template contamination or negative colonies. 100% positive clones.
- More vectors can be generated
- Protein expression can be easily optimised
- Time efficient - cloning to expression can be done in shorter time frame as compared to conventional strategies

Business Model:

Proof-of-concept has been demonstrated. Currently, seeking potential partners to further refine the technology and commercialize.

Principal Investigator(s): **Dr. Muniasamy Neerathilingam, C-CAMP**

Invention ID: CMP-035

IP Status: Patent Pending

Jurisdictions: PCT filed

For more details, please write to:
techtransfer [at] ccamp.res.in

25 *In vitro* Production of Metabolites from Neem Endophytes

The Novel Technology:

The invention describes endophytic/epiphytic media formulation for isolation of endophytes (Bacteria and Fungi) from various neem parts or tissues and *in vitro* production of neem metabolites such as Nimbin, Salanin, Azadirachtin, etc. Currently, neem metabolites are derived from seeds which are season based wherein this technology can help to overcome the issue.

Applications:

- To produce bio-pesticides, antibiotics, bio-fungicides, bio-bactericides, growth promoting hormones and bio-viricides or other metabolites from endophytes
- To use metabolites purifications from neem endophytes to manage/control of insects, pests and diseases of plants and animals
- To use neem endophytes metabolites as the source of antibiotics for human and animal diseases
- To use neem endophytes metabolites as source materials to produce important metabolites (eg: anti-cancer)
- To use endophytic media formulation as relevant assay for screening several medical and agricultural pathogens and pests
- To use neem endophytic metabolites as source for proteins and enzymes to target diseases
- To use neem endophytic metabolites as source for enzymes for industrial applications such as fermentation, biofuel (production of ethanol), paper, food, leather curing, etc.,

Advantages:

- The media provide essential nutrients for growth of neem endophytes and helps in producing host metabolites such as Nimbin and Salanin
- Facilitates in mass production and purification of bio-pesticides, antibiotics, bio-fungicides, bio-bactericides and bio-viricides
- Helps in commercial production of bio-compounds
- Production of endophytes all through the year compared to natural resource of neem flowering and seeding, which is seasonal
- Neem media helps in isolating true endophytes from particular plant species
- Cost effective

Business Model: Proof of concept has been demonstrated and the technology has been exploited for certain agricultural applications through trial license. Currently seeking industrial partners for collaboration or licensing for further development of this technology. Open for collaborating opportunities to explore endophytes from other tropical plants, trees, medicinal shrubs, etc.

Principal Investigator(s): **Dr.Malali Gowda, C-CAMP**

Invention ID: CMP-037

IP Status: Patent Pending

Jurisdictions: India (IN) Provisional filed

For more details, please write to: techtransfer [at] ccamp.res.in

26 Mode Locked Laser for Generating a Wavelength Stabilized Depletion Pulse

The Novel Technology:

The invention discloses a method of generating a wavelength stabilized optical signal by operating a mode-locked fiber laser (MLL).

Applications:

- To use as an add-on to a microscopy imaging system
- To use in systems such as LIDAR and for THz generation for re-optimization
- To use in any system to synchronize optical pulses of high peak power
- To generate high power optical pulses with sub-nanosecond pulse width

Advantages:

- Lasers are compact, convenient and easy to maintain
- Less heating issues
- No damage to samples

Business Model:

The technology is in early stage of development and currently seeking commercial partners for technology collaboration/development/licensing.

Principal Investigator(s): **Dr. Anil Prabhakar, IITM and Prof. Satyajit Mayor, NCBS**

Invention ID: CMP-036

IP Status: Patent Pending

Jurisdictions: India (IN), PCT filed

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