**START-UP PROPOSAL**

**Physical methods Green technology for purification of various Bio-fluids**

1. ***Personal Information***

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1. ***Abstract of the Proposal (200 words)***

Our proposal-

1. Viable technology substitute to the cold chain employed in milk transport through tankers-

Milk being the most widely consumed dairy product throughout India, needs to be protected from any spoilage or contamination during long transportation period. The dairy industry thus needs a more economical and easy method to keep milk safe without changing its chemical composition and protein structures.

Silver and copper are established antimicrobial agents. This is justified by the fact that until a few years back, people would store water in copper vessels. Silver has been used to a larger extent for medical purposes such as in wound dressings, creams and as an antibiotic coating on medical devises due to heavy risk of infection to the patients.

Such traditional methods can be used for preventing the spoilage of milk and would help in purification of various other bio fluids including water.

1. Packaged oxygenated, Silver-copper-water. -

The idea of packaged oxygenated copper-based water is that there are various mineral water bottle companies in market that supply packaged, bottled water to people. If water gets the goodness of copper and silver ions and later oxygenated, it will not only reduce the microbial load in water for a longer time but the person consuming it will feel more energetic as this water is essentially rich in oxygen. This would also be highly useful in hilly areas.

1. A portable machine for generating potable water. -

Another issue faced by rural India and travellers is the availability of fresh and drinkable water. After the contamination of our water bodies, bacteria have been the major pollutant in water which can cause deadly diseases and can even be fatal sometimes. So, using a portable machine for instant purification of water to make it drinkable without boiling by using charge for bacterial killing is need for present hour so that anyone can get access to bacteria free water anytime and anywhere.

1. Water purification technology using nano-silver CNT cartridge system. –

With increased surface area, and the goodness of silver ,CNT can be used to make a water purification wick which can be used to purify water efficiently and without any secondary pollution of iodine and chlorine used.

***Introduction to Ideation***

* 1. *Broad Industry Sector:*

Fluid cleansing technologies

*What is the Product / Service?*

1. Viable technology substitute to the cold chain employed in milk transport tankers.
2. Packaged oxygenated, Silver-copper-water.
3. A portable machine for generating potable water
4. Water purification technology using nano-silver CNT cartridge system
   1. *Who is the beneficiary of Product / Service?*
5. Viable technology substitute to the cold chain employed in milk transport tankers. - grassroot rural milk producers, milk transporters, electricity saving and green environment, organised milk and milk producing sector.
6. Packaged oxygenated, Silver-copper-water. – General health conscious public, amended in socio-religious ethos of India, enhancing shelf life of processed water.
7. A portable machine for generating potable water – Indian armed forces. Travellers, trekkers, rural public. Substitute for processed bottle water for rural India.
8. Water purification technology using nano-silver CNT cartridge system- Making water purification more efficient at lower cost. Making the cartridges more efficient by increasing the surface area. Rural health improvement by providing water purification techniques.
   1. *What is the idea / innovation?*

* Copper and silver vessels had traditionally been used by people to store water and other liquids due to its inherent antibacterial property. Same is the case with silver. We have conducted lab R&D to treat water with copper and silver and bring into market a product, involving treated oxygenated water. There is a large segment of society which would like to consume this silver-copper water (all religious and health minded).
* The principle of antibacterial activity of silver could also be employed in the cold chains maintained during the logistics of milk which will eventually bring down the costs involved. This can be done by carrying out optimization studies for the use of silver or its nano particles and subsequently develop its paint. This paint can be used to coat the inside of milk vessels to reduce the microbial load for a longer time interval and suspend the need for extreme temperature conditions. We propose to use safe paint containing silver/nano silver to paint the inside of tank to reduce the rate of rancidity of milk and cost of cold chains.
* The negative charge on bacteria is due to the structure and composition of its cell wall. Consequently, it gets repelled by negative charge. We aim to design a portable machine which puts charge on the surface of a hollow container and stops bacteria (present in the fluid) from adhering to the surface by virtue of charge. This is a physical method of purifying water instantly anywhere without having the need to boil it.
* Before the invention of RO technology, water was purified by passing it through charcoal, sand and silt and ion exchange resin releasing iodine and chlorine in water. This caused purification but the harmful effects of iodine and chlorine cannot be neglected. Using nano-silver CNT cartridge system leads to no silver leakage and more provides more surface area for more effiency.
  1. *Is it an Idea or you have validated any proof of concept?*

We have the proof of concept for each product.

1. We have tested the antimicrobial activity of silver and copper on various samples of milk and water.
2. We have tested the repulsion of bacterial adhesion to a metal surface using a 9-volt battery.
3. CNT tech is now generic and scaled up. At the primitive stages antibacterial silver/nano silver will be added. Milling technologies have been proved very cost efficient for generation of nano-silver particles of different sizes.
   1. *If you have started any work on it, has it generated some revenue?*

No. Lab technology has been confirmed. Scale up will be planned through project and commercialisation.

* 1. *What experiments will you like to do?*
     1. Proof of concept is done. But scale up experiment will be done.
     2. Lab stability data.
     3. Reduction of microbial load Vs concentration and size of copper or silver ions used: lab experiments.
     4. Resistance of bacteria, if any.
     5. Antifungal activity / anti-spore activity characterization.
     6. Optimization experiments for the setup.
  2. *What will be requirement to get idea conceptualized*
     1. Funds
     2. Lab facilities
     3. Interaction with prospective business partners for transfer of technology.

1. **Start-up Plan**
   1. *Who are the targeted founders/cofounders/promoters?*
      1. The core team consists of 03 young entrepreneurs.
   2. *Specify role of each promoter/mentor*

There is 01 mentor:

* Dr. Aradhana Srivastava (Associate professor, USCT, GGSIPU)- is providing technical and scientific mentoring. She has 22 years of research experience and constantly working on projects related to water treatment, food preservation, value added products production processes.

*Since how long have you been working together on this idea*

* 06 months.

1. **On Your Business Idea**
   1. *What is the financial viability plan for start-up?*

* Packaged oxygenated, Silver-copper-water-

Rs 20,000- Developmental cost for measurement of shelf life, ppm allowed, bacteriological and virucide activity, best before date and adsorption.

Rs 30,000 for lab testing (comparison with RO technology)

Rs 50,000 for advertisement and travel purpose.

**Total cost- 1,00,000Rs.**

* Portable machine for generating potable water. –

Rs 10000 for painting,

Rs 50,000 for optimization studies,

Rs 50,000 for development process,

Rs 50,000 for testing and Lab development cost.

Rs 2,00,000 for limited series production.

Rs 1,50,000 for Miscellaneous advertisement and generating business.

**Total cost- 5,00,000Rs.**

* Viable technology substitute to the cold chain employed in milk tankers. - grp of tech to reduce cost and rancidity and prevent bacterial dev by wall silver. Charge and silver may be applied on sieve.

Rs 2,00,000 for development.

Rs 4,00,000 for scaleup, Charge technology, Nano silver paint tech, microbial tech.

Rs 2,00,000 for advertisement.

**Total cost- 8,00,000Rs.**

* nano-silver CNT cartridge system. –

Rs 50,000 for development.

Rs 50,000 for limited series production.

Rs 50,000 for miscellaneous cost.

**Total cost- 1,50,000Rs.**

* **TOTAL COST- 15,50,000Rs.**
* All advantages accruing to start-ups will be incorporated and all responsibilities executed as per Law
* Company Std. Operative Procedure will be created as an official document.
* Provision of shared patents with incubator & user agencies will be a stated policy of the company.
* Operations from home for 02 years to cut down expenses. Official address may also be provided by the incubator: DIIF
  1. *What are the sources of funds from self / other cofounders / anticipated from the incubation centre?*

Self

* 1. *Anticipated competition and current industry position with respect to your idea.*

1. There is no competition in silver-copper water and milk preservation technology to best of my knowledge.
2. Travellers might use boiling and chlorine tablets to purify water but our green technique is more cost friendly and efficient and does not distaste the water.
   1. *Uniqueness of your start-up with respect to the product /service.*

* All the products are based on sound technology with reduced environmental constraints, low cost input and large catchment population.
* Only we are privy to the above-mentioned technology.
* Team members have themselves worked on the concepts and the combination of technologies in order to come up with a theory of developing the mentioned products.
* Efforts have been made to undertake ‘Make in India’ approach.
* The products are concordant with the central government’s idea of provision of clean water to everyone by 2021.
* The Mentor has a great experience with industrial products and working, covering all areas where mentoring will be needed.
* Team members and mentor know each other for more than 3 years.
* Team members complement each other with respect to technical knowledge, management capabilities and other soft skills.
* Product idea has been discussed with mentors many times and optimization process planning has been started.
  1. *How do you view your technology / idea with respect to sustainability?*
* Products are niche, innovative, relevant & cost effective and absolutely green.
* Product safety test have been planned.
* Items are required for conditions that do not have many ideal solutions as of now in the context.
* The traditional values of Indians regarding silver and copper as utensils for storage has been honoured.
  1. *Target Market (customer segment) identification; market size and trend, how much market share you can gain over next 03 years*
* Dairy farms and milk supplying companies
* General rural households.
* Travellers and explorers who need clean water.
* General public for copper water, esp. the health-conscious society for copper water.

1. **Strategy**
   1. *What if you do not get the incubation support from DIIF*

* The project will be delayed by a considerable amount of time due to lack of funds.
* Focus of the team will shift from technology maturation to generation of funds.
* The logistics cost for milk continue to remain high, as they are.
* Rural people deprived from possible health benefits.
* The possibility of increasing the market for milk industry in general remains unexplored.
* The team leader will be under stress to keep the flock together for 6 months.
  1. *What if you get the incubation support from DIIF?*

1. The above stated process will be kick-started immediately.
2. We will conduct meetings with incubator mentors immediately to make a work plan by consensus.
3. Administrative and technical work will begin for smooth and effective working, even before the actual funding.
   1. *How do you plan to scale up your start up?*
4. TOT of Milk transporting technology and packaged copper-silver water to be done in 3 years.
5. CNT cartridges to be sold to a relevant industry.
6. Portable machine project to be pursued as the running business of team.
   1. *What are the challenges you are facing now and you foresee in the next 2 years?*

* Limited business and incubation opportunities in reality despite efforts by the govt.
* Govt. funded start-ups usually face a bad reputation because of high failure rate due to which, the investment becomes non-returnable.
* Difficulty in generating timely funds from other sources by dealing with potential investors.
* Difficulty in making the rural people accept the alternatives of water purification due to resistance to change.
* There is a heavy set of rules for the new start-ups to abide by and need to concentrate on technology maturation rather than focusing on approval of govt at various stages.

1. **Requirements**
   1. *Requirement of the meeting room (frequency of meeting / month)*

*Yes*

* 1. *Assistance in Quality control and management.*
  2. Incubator & mentor assistance required in Quality control and management.
  3. Incubator Funds required in time

1. **Expected Milestones (every 06 months)**

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| --- | --- | --- | --- | --- | --- |
| **S.No.** | **Technology** | **Lab R&D** | **Prototype 1** | **Prototype 2** | **Scale up** |
| 1. | Packaged copper-based water | 3 months | 2 months | 2 months | 5 months |
| 2. | Portable machine for travellers | 7 months | 4 months | 3 months | 7 months |
| 3. | Milk transport vessels | 1 yr. | 3 months | 2 months | 7 months |
| 4. | CNT embedded cartridges | 5 months | 4 months | 4 months | 8 months |