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SERB-Notification

SERB_Administrator@serbonline.in <SERB_Administrator@serbonline.in> Thu, Sep 30, 2021 at 2:01 AM
To: serbinfo1@gmail.com

Science and Engineering Research Board

(Statutory Body Established Through an Act of Parliament : SERB Act 2008)
Department of Science and Technology, Government of India

Dear Sneha Thakur,

Your Proposal has been submitted for preliminary scrutiny. Kindly quote project's file no SPG/2021/002749 in all future correspondence.The project's file number should be mentioned in all research communications arising from the above project.

With Regards

SERB Portal Team.

MULTIPURPOSE ANTIVIRAL NANOCOATED POROUS MASKS AND POCKET OXYGEN INHALERS

Origin of the Proposal

The COVID-19 outbreak globally could initiate the distance need between the people and also emphasized keen motive of preventing the communicable diseases that spread thru nasal and oral route like tuberculosis, protozoal diseases, bacterial and viral infections with the use of masks(N95, cotton fibers and recent advancement nano coated mask in Bengaluru i.e., N91) and when hospitalized could necessitate the prevention of death by respiratory masks supplied with oxygen cylinders . All the masks could combat the spread of the disease up to 75%. Perhaps there was no close contact between the people during the lockdown which was major contribution for the disease despite wearing the masks. When the second wave of pandemic was announced, the need for double masks was invariably enhanced which could create suffocation, breathing problems and also there were very less reports for the usage of masks in children. There was huge demand for the oxygen cylinders and also the lack of oxygen could report in major deaths. Hence to prevent such a life threatening situation and also to prevent the spread of the communicable disease always there should be protection to nose and mouth which are major body parts that inhale the virus, bacteria and other air contaminants which potentiate the harmful effects to internal organs like lungs and heart resulting in breathing problems and cardiac failure. The advantage of antiviral properties of nanocoatings is being exploited.

Novelty in the research work

The microbes in the air are very minute and have gain 99% entry into the body through mouth and nose. Hence the entry could be prevented by formulating an antiviral nanocoated porous mask which prevents the entry through nasal passage and also pocket oxygen inhalers which can be used by all ages(as the presence of oxygen or the inhalation of more oxygen will kill the anaerobic microbes). The conventional mask create suffocation and takes large area for covering outer parts like nose and mouth with support of the ears. This multipurpose masks when formulated will prevent all such discomfort modalities and also could be used with improved aesthetic value in children.

PROPOSAL DETAILS

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Technical Details :

Scheme :	SERB-POWER Grant		
Research Area :	Biomedical and Health Sciences (BHS) (Life Sciences)		
Duration :	36 Months	**Contact No :**	+919032783548
Date of Birth :	21-Jul-1989		
Nationality :	INDIAN	**Total Cost (INR) :**	28,38,116

Is PI from National Laboratory/Research Institution ? No

Project Summary :

The research interest is oriented in the preparation of multipurpose masks and pocket oxygen inhalators using the green silver nanosynthesis method which overcomes the spread of communicable diseases that occur due to inhalation. The formulation design will develop silicon porous mask on to which the herbal nanocoating of blue silver will be applied in micron thickness. Further the nanocoating will be tested for the microbe filtration and antimicrobial capacity. The oxygen inhalators when formulation using nanoaerosol technique will surely address the killing the anaerobic microbe's right from the entry path. Thus the proposal would be successful aid to prevent the spread of microbes and also helped to prevent the communicable diseases. This research interest could be commercialized as point of national health security mission.

Objectives :

- To produce the silicon fire base and also to prepare aromatic nanocoating with antimicrobial properties(antiviral, antibacterial and antifungal)
- To design formulate and evaluate the nanocoated porous masks
- To further improve the aesthetic value of mask by removing ear hangings and just a transparent micrometer mask
- To prepare oxygen inhalators with compressed oxygen and aromatic nano aerosol technology
- To evaluate for the capability of prepared nanocoated masks and oxygen inhalators in preventing the entry of microbes and also acting as antimicrobials

Keywords :

Nanocoating, porous masks, pocket oxygen inhalators, antimicrobial, antiviral

Expected Output and Outcome of the proposal :

The formulation of nanocoated masks and pocket oxygen inhalators is innovative which prevents the entry of microbes through nasal and oral routes. Further the design of the nanocoated masks would prevent the suffocation problems by its transparent design and porous nature. The nanocoatings will act as antimicrobial that prevents the entry of microbes. The proposal is novel and would address protection and extensive use due to its ease in aesthetic value for preventing communicable disease including pandemic in the near future. The research will address the objectives of national health security mission.

Any other relevant information:

Many people are vaccinated against Covid but still there are people without vaccination and the spread of infections including Covid is to be a important headline always.Although there are many covid masks available still there new emerging viral diseases which are spreading thru the nasal and oral route. The age group below 8 years are uncomfortable with conventional masks. Adults also feel the mask as chin protectors. Hence the need for appropriate protectives is always in high priority status by the national health security mission in the near future to decrease the incidence of communicable viral diseases including cold.

Suitability of the proposed work in major national initiatives of the Government:

Make in India

Theme of Proposed Work:

Health, Environment

SERBPOWER
PROMOTING OPPORTUNITIES FOR WOMEN IN EXPLORATORY RESEARCH

MULTIPURPOSE ANTIVIRAL NANOCOATED POROUS MASKS AND POCKET OXYGEN INHALERS

Reference No. : 162021002030

Saved By : Dr. Sneha Thakur

Saved Date : 09-Sep-2021

Review of status of Research and Development in the subject

2.1. International Status

A total of 1284 patents were identified for preliminary assessment from the database, of which 113 patents were duplications, 1 patent was excluded because they had no title available, and 81 were excluded due to the fact that full text was unavailable. Also, after reading the title and abstract, 526 patents were excluded from being outside the focus of our review. So, we excluded patents about masks used for other purposes and not to protect against pathogens such as viruses and dust particles. Finally, 563 patents were selected for our analysis according to the objective of the study out of which 150 patents were selected and classified into eight groups, among them: masks for dust and particles, masks with several filter layers, antiviral masks, fabric masks, face shield, as well as masks involving nanotechnology, ultraviolet, and other types of technologies.

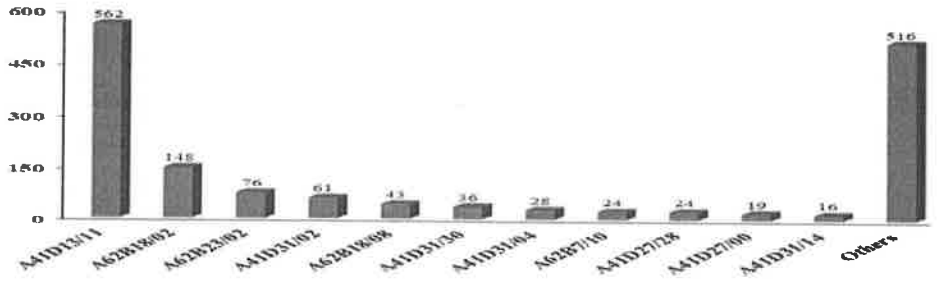


Figure: illustrates the patent numbers relevant to masks prepared under different categories

Final selection of patents: IPC. A41D13/11: protective face masks, e.g., for surgical use, or for use in foul atmospheres; A62B18/02: masks; A62B23/02: for respirators; A41D31/02: layered materials; A62B18/08: component parts for gas-masks or gas-helmets, e.g., windows, straps, speech transmitters, signal devices; A41D31/30: antiviral, e.g., anti-bacteria; A41D31/04: characterized by special function or use; A62B7/10: with filter elements; A41D27/28: means for ventilation; A41D27/00: details of garments or of their making; A41D31/14: air permeable, i.e., capable of being penetrated by gases.

As per the international review there is no status of nanocoated porous mask and pocket oxygen inhalers

The list of countries who filed patents on nanocoated and antibacterial masks via the industry/academia intervention is presented below;

Title	Reference	Publication number	Innovation
Nanofiber mask with efficient filtering function	Yaoxin Z, Shaoyun L, inventors; Chiefdon Xiamen Tech Co Ltd, assignee. Nanofiber mask with efficient filtering function. CANADA210353320 (U). 2020.	CN210353320 (U)	Nanofiber mask
Electrostatic spinning nanofiber mask	Junbo F, inventor; Junbo F, assignee. Electrostatic spinning nanofiber mask. CANADA210094734 (U). 2020.	CN210094734 (U)	Electrostatic spinning nanofiber mask
Nanometer silver-loaded titanium dioxide mask	Guang L, inventor; Shenzhen Dezhi Tech Co Ltd, assignee. Nanometer silver-loaded titanium dioxide mask. CANADA109757809 (A). 2019.	CN109757809 (A)	Nanometer mask silver-loaded titanium dioxide
Antibacterial mask and manufacturing method thereof	Xiaodong H, Yiren Y, Jie D, inventors; Shenzhen Yuanfang Tech New Material Co Ltd, assignee. Antibacterial mask and manufacturing method thereof. CANADA110584239 (A). 2019.	CN110584239 (A)	Antibacterial mask (prepared by taking an inorganic nano-antibacterial material)
Antibacterial mask with providing vibration isolation	Jik SS, inventor; Jik SS, assignee. Antibacterial mask with providing vibration isolation. KOREA20190080544 (A). 2019.	KR20190080544 (A)	Antiviral mask with an anti-vibration function (nanofiber with an enhanced anti-vibration function)
Nano silver wire air filtering screen, antibacterial mask	Yaosheng L, Jianzhi J, Fengzhang P, inventors; Aeneq zhejiang intelligent equipment Co Ltd, assignee. Nano silver wire air filtering screen, antibacterial mask and production method.	CN110743281 (A)	Antibacterial mask with nano silver wire filtering membrane
Nano carbon mask	Langyan L, Yushan L, Yingjun N, Xiaoqin C, inventors; Pui ching middle school, assignee. Nano carbon mask. CANADA208925292 (U). 2019.	CN208925292 (U)	Nanometer carbon mask
Superfine fiber mask	Lihui G, Hao G, Yanming D, Yuanbo Z, inventors; Jiangsu Emp Tech Co Ltd, assignee. Superfine fiber mask. CANADA210382754 (U). 2020.	CN210382754 (U)	Superfine fiber mask

Title	Reference	Publication number	Innovation
The invention discloses a nano negative ion powder environment-friendly mask	Sigui P, Tielin L, inventors; Shenzhen strongteam decoration Eng Co Ltd, assignee. The invention discloses a nano negative ion powder environment-friendly mask. CANADA208891751 (U). 2019.	CN208891751 (U)	Environment-friendly mask a nanometer negative ion powder
Graphene oxide-based nanofiber mask	Chenglin Z, inventor; Zhejiang yueshi new material tech Co Ltd, assignee. Graphene oxide-based nanofiber mask. CANADA209436296 (U). 2019.	CN209436296 (U)	Graphene oxide based nanofiber mask
Nanothin film mask	Nano thin film mask 2019	KR20190002899	Nano thin film mask

***2.2* National Status:**

"Masks are still used either as 'chin protectors' or not being worn at all, thereby throwing caution to the wind about their own safety and that of the public". (Source: The Indian scenario). A recent study done by ApnaMask, an initiative by EkDesh, revealed that 90 per cent people are aware of the guidelines issued by the government and risk but only 44 per cent of India is wearing a face mask.. The Indian people believe in the innate immunity and aesthetic value of the product. In this context there are very less products that could answer the proper balance for using the masks and the prevention. The surrounding hygiene even in the urban population is still lacking which is aggravating the spread of communicable diseases. There is lot gap in the use of masks or the awareness regarding the precautions to be taken by the public to prevent the communicable diseases which spread thru nasal and oral route like COVID, T.B, protozoal, bacterial and viral infections.

The masks prepared like The Amrita N96 Nano Mask, copper coated, N95 respiratory mask, faces shields, recent advancement N91 even formulated could address the protection issue but not the cost and comfort.

There is very less literature available for pocket oxygen inhalers as the oxygen presence will prevent the entry of anaerobic microbes. The national health security mission for prevention of communicable diseases could be answered with the help of formulating porous nanocoated masks that filter the entry of microbes and also pocket oxygen inhalers.

2.3. Importance of the proposed project in the context of current status

The communicable diseases have huge history with its spread and impact on the health status with moderate mortality incidence. The recent COVID pandemic has raised huge concern on wearing protective's and use of sanitizers. Although the use of sanitizers and protective masks were on surge that could not stop the spread of COVID or other communicable diseases due to their virulency. The COVID Pandemic has raised concerns over the distance between the people and also avoids gathering of large crowd. This could affect the population globally in terms of economy, health and nutrition instability and also mental imbalance resulted due to depression. It is not just this pandemic but there were other pandemics like plague, malaria which potentiate the need of antiviral coverings to prevent communicable diseases. Thus the rationale was derived to develop "multipurpose nanoporous masks and pocket oxygen inhalators" which can prevent the microbe entry into the body. This could definitely make the mask acceptance to be worn by the children even due to its transparent design. Also the pocket oxygen inhalers could be a perfect answer to prevent the entry or maintain respiratory health. The oxygen inhalers when maintained in pocket will ensure the oxygen levels in the body. Thus the ecofriendly, viral protective and antibacterial products are innovative in health care aspect and would answer the objective of national health mission.

2.4 If the project is location specific, basis for selection of location be highlighted:

The project would be more active and specific for Indian population as there is very less percent population who are wearing protective and maintain respiratory health.

3. Work Plan:

3.1 Methodology:

For antiviral nanocoated masks

- **To identify, characterize and study the antiviral nature of the extract or phytoconstituent selected**
  1. Identify the antiviral phytoconstituent or the extract and analyze the purity or the phytochemical nature using the techniques like NMR, MASS, HPLC and GC.
  2. To perform the agar well diffusion method to screen for the antiviral activity and report the MIC values that determine the antiviral potential.
- **Green synthesis of silver nanoparticles for antiviral coating**

  Prepare 0.1M silver nitrate solution

  To weigh 1.697 g of silver nitrate and dissolve in distilled water

  Green silver nanoparticles synthesis

  The 0.1 M silver nitrate solution is mixed with suitable amount of extract or the phytoconstituent under monitored conditions of temperature, agitation speed and pH. The green synthesized silver antiviral nanocoating is used for coating the mask.
- **To prepare a nanofiber base.**

  The available nanofibers (carbon or graphene oxide) will be coated on the solid silica base which is fabricated in μm and then the nanofibers will be coated as a thin film. Then pores are minute in the nanofibers and facilitate the air flow
- **To formulate the mask by coating the nano formulated antiviral compound**

  To further coat the nano formulation of antiviral compound using the nanocoating machine in different layers. The layers will be very fine in μm diameter which ensures the mask to be a porous thin film layer.
- **To formulate the attachment**

  To formulate a fine PPE based non ear hanging transparent attachment that covers the nasal and oral areas only ensuring less pressure o the ear. These enhances the aesthetic value and eases of use by preventing suffocation and nill pressure on the ear which is major drawback by the conventional masks.

- **To prepare a aperture for RT PCR test**

The mask will be suitably fitted with minute aperture to perform the RT PCR test without removal of the mask. The mask is reusable as it is made of nanofiber and can be used in near future as a protective.

- **Evaluation for viral aerosol filteration capacity and antibacterial nature**

The antibacterial nature will be tested by impregnating the mask disc on the agar filter media and comprising with the standards in the diffusion method. Further the viral aerosol filtration will be tested by aspectically in the lab to test the virus Filtration Efficiency (VFE). The Viral Filtration Efficiency (VFE) test follows the same procedure as BFE, except the challenge organism used is the bacteriophage phiX174. Challenge controls are maintained at 1100-3300 plaque-forming units (PFU) with a mean particle size (MPS) of 3.0 ± 0.3 μm. This allows filtration efficiencies to be reported up to >99.9%.

- **Evaluation on the human volunteers**

The ethical permission will be seeked as per the human ethics committee and a pilot trial will be conducted for protective capability.

Methodology For pocket oxygen inhalers

- **Prepare compressed oxygen**

The liquid oxygen could be compressed under reduced to pressure to gas and filled in the inhalers using aerosol technology.

- **Formulate the nanoaromatic oil for improving respiration capability**

The aromatic oil from the Ocimum sanctum is known to be the best agent for improving the respiratory health along with antiviral nature. Thus it would be converted into nanodroplets by green synthesis method.

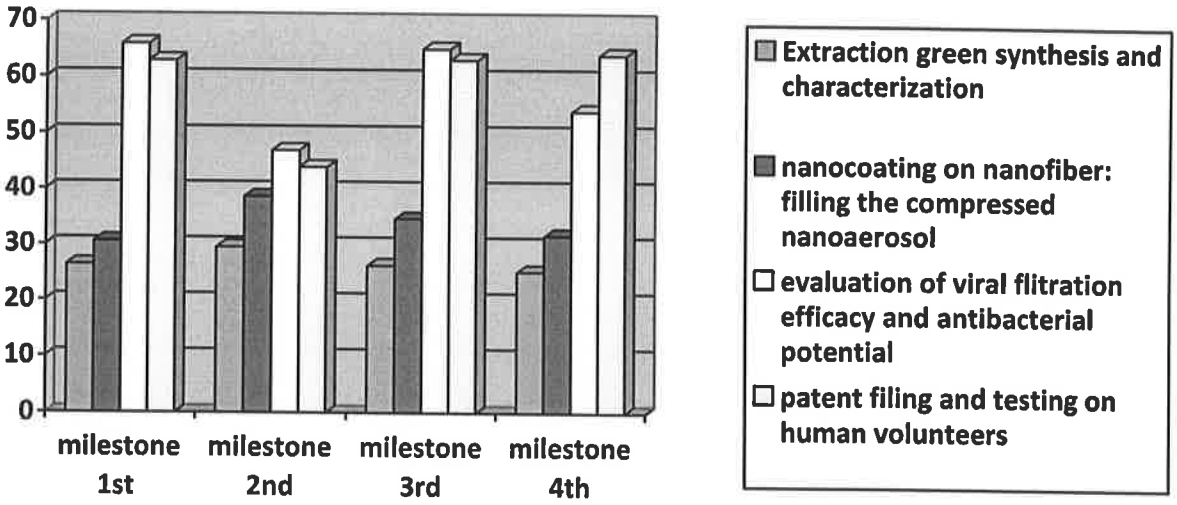
- **Filling in the inhalers with aerosol technology**

  The oxygen inhalers could be prepared by initially filling the plastic bottle fitted with a nozzle of suitable aperture size or inhalers. Then the nano aromatic oil and the compressed oxygen could be filled under reduced pressure to produce the nanoaerosols as spray coatings which when applied with suitable pressure will produce mist.

- **Evaluation on the human volunteers**

  The ethical permission will be seeked as per the human ethics committee and a pilot trial will be conducted for protective capability.

3.2 Time Schedule of activities giving milestones through BAR diagram. (Maximum 1 page)



Milestone 1: 6months form initiation

Milestone 2: 12 months from 1st step

Milestone 3: 6 months from 2nd step

Milestone 4: 6 months from 3rd milestone

Milestone 5: 8 months from initiation

***3.3.* Suggested Plan of action for utilization of research outcome expected from the project.**

For nanocoated p orous masks

- The authenticated herbs selected will be extracted and identified for antiviral capacity.
- Formulation of green silver nanoparticles of antiviral phytoconstituent or the extract.
- Formulation of thin layer of nanofiber
- Formulation of nanocoating on the nanofiber layer in accurate proportions to form several layers.
- Evaluation of antiviral filtration capability, antibacterial efficacy.

- Evaluation on human volunteers

For pocket oxygen inhalers

- Preparing compressed oxygen and nanoaromatic oil.
- Filling into the inhalers using aerosol technology.

3.4 Environmental impact assessment and risk analysis.

There is no harm as such for the environment with ecofriendly masks and pocket oxygen inhalers. Infact the use of nanocoated masks could benefit the environment by creating microbe free environment for the spread of a disease which will be restricted to the individual who will not be able to spread the droplets of infection outside the mask. There is no risk as such with nanocoatings on the mask or due to nanoinhalers and due to involvement of green silver nanoparticles they are recommended to be safe and effective in terms of usage with less reported toxicity.

The benefits over weigh the risks and ensure the ecofriendly aspect of nanocoated masks and pocket oxygen inhalers which definitely prevent the spread or ensure the killing of anaerobic microbes.

4. Expertise:

(Professional expertise existing with each of the investigators in terms of publications, Patents and preliminary results, to execute every component of the proposal should be highlighted)

Principal investigator expertise

The principal investigator has worked on the green synthesis of extrats, phytoconstituents and also nucleic acids along with their characterization using spectrophotometric techniques like UV, HPLC,SEM, FTIR, XRD, DLS and TEM .

The investigator also has key knowledge on the isolation, characterization of phytoconstituents and bioscreening of the nanoparticles and phytoconstituents in various invivo and invitro models.

Key areas of expertise include

Phytochemistry

Nanotechnology

Pharmacognosy and bioscreening

Co investigator expertise

The co investigator is highly expertise in the method development validation and characterization of biomolecules. The investigator has 18 years of experience in analytical department of pharmaceutical sciences.

The co investigator has more than 60 publications in high indexed journals.

Key areas of expertise

Pharmaceutical analysis

Analytical R&D

Bioscreening

4.1. **Expertise available with the investigators in executing the project:**

The investigators are working in R&D equipped, accredited institutes who have already worked on the collaborated projects. The institute is located in the metro areas and has access to national laboratories and also the expertise available with them. The sources of API and also the adjuvants is within the institutes with all the characterization facilities. In addition to that there is approved animal housing facility to perform the preclinical studies. There are well built technology like aerosol technology, nanoparticle analyzers which make the work more handy and easy to accomplish in time.

The project could be handled even as a pre pilot scale in the lab by the students available in the institute. The publication assistance and also the patent expertise lies within the investigators.

4.2 Summary of roles/responsibilities for all Investigators:

S. No	Name of the Investigators	Roles/Responsibilities
1	***Principal investigator***	Conduct the research and document the literature Formulate research plan and set objectives Conduct the formulation ad evaluation of the project Conduct the efficacy based statistical analysis and state the relevance of the outcome Conduct the study as per the research plan Evaluate the outcomes Propose the summary

		Monitor the research and conduct on site visits to understand the progress of the study Achieve the milestones within the time set
2	***Co- investigator***	Conduct and formulate the research plan Identify and characterize the potential molecules Evaluate the selected criteria Give feedback and suggest the changes needed to get best of the study Formulate and evaluate research plan Monitor the research and conduct on site visits to understand the progress of the study Achieve the milestones within the time set
3	Research associate	Conduct the research as per the research guidelines and frame work of plan Update time to time the study and observations Formulate the research guidelines and approvals Documentation of the study Evaluate and present prerequisites to the mentors Summarize and plan outcome

4.3 Key publications published by the Investigators pertaining to the theme of the proposal during the last 5 years

Principal investigator key publications

1. Plant-Mediated Synthesis of Silver Nanoparticles – A Critical Review, "Sneha Thakur, Krishna Mohan G, Sandhya Rani M, International Journal of Pharmacognosy and Phytochemical Research, 2017; 9(7); 947-956. ISSN: 0975-4873.
2. "Green Synthesis Of Silver Nanoparticles Of Divya Churna And Evaluation Of Its *Invitro* Antibacterial And Antioxidant Activities" Sneha Thakur, G. Krishna Mohan, International Journal of Research and Analytical Reviews December 2018, Volume 5,

Issue 4. E-ISSN 2348-1269, P- ISSN 2349-5138.

3. "Green synthesis of silver nanoparticles of boswellic acid and it's in vitro anticancer activity" Sneha Thakur, Dr. G. Krishna Mohan International journal of pharma and biosciences, Int J Pharma Bio Sci 2019 July; 10(3): (P) 92-100.
4. "Green Synthesis Of Silver Nanoparticles Of Onion DNA And Screening For In vitro Antityrosinase Activity Sneha Thakur, Krishna Mohan G", Asian Journal of Pharmaceutical and Clinical Research, Vol 12, Issue 9, 2019, 1-5.
5. "Green Synthesis of Silver Nanoparticles of Onion DNA and Screening for it's in vitro Antibacterial and Anticancer Activity", Thakur S, Mohan GK (2019). Asian Journal of Ethnopharmacology and Medicinal Foods Vol: 5, Issue: 4 (05-14).
6. Anticancer Activity of Onion DNA Silver Nanoparticles on A549, MCF 7 Cell Lines and In vitro Drug Release Kinetics, Sneha Thakur, Dr.G.Krishna mohan (2021), Applied nanoscience,appsci-11-01558-v2
7. Nucleic Acid Nanostructures–DNA and RNA Nanoparticles, Lekhana S, Kanishka B, Sneha Thakur*, International Journal of Pharmacognosy and Phytochemical Research. 2020;12(2):94-102. DOI: 10.25258/phyto.12.2.5.
8. "Invivo Antiinflammatory Activity Of Boswellic Acid Silver Nanoparticles And In Vitro Drug Release Kinetics", Sneha Thakur, Dr.G.Krishna mohan, Bionanoscience,2021, BNSC-D-21-00170.

Co-investigator key publications

1. Mohammed Azam, Makula Ajitha. Phyllanthin: A potential lead molecule for the future needs. International journal of Pharmacognosy and phytochemical research. 2017; 9(8); 1081-1089. Impact Factor:1.846.
2. A. Mounika ,M. Ajitha, Y.V.Rajesh. Stability Indicating Assay Method Development And Validation Of Clomipramine Hydrochloride Capsules By RPHPLC. Journal of Emerging Technologies and Innovative Research. November 2018, Volume 5, Issue 11(566-576).
3. P.Manasa, M. Ajitha, A.Vijay Goud. Stability Indicating Assay Method Development And Validation Of Enr*Tablets By RP-HPLC. Journal of Emerging Technologies and Innovative Research. November 2018, Volume 5, Issue 11(556- 565).
4. Podchanpalli Balraj, M. Ajitha, Sanjay.H.Pasi,K.S.L.Harika. Stability Indicating Assay Method Development And Validation Of Naproxen Sodium In Pharmaceutical Tablet

Dosage Forms By RP-HPLC. Journal of Emerging Technologies and Innovative Research. December 2018 Volume 5, Issue 12(190- 202).

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7. Sireesha Doddaa, Ajitha Makula, Srinivasa Rao Polagani, Raj Narayana Kandhagatla. High sensitive LC–MS/MS method for estimation of eluxadoline in human plasma and its application to pharmacokinetic study. Journal of Pharmaceutical and Biomedical Analysis 165 (2019) 65–72.
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transmission: a study of a family cluster. Lancet. Lancet Publishing Group. 2020;395:514–23.CAS Google Scholar
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5. List of Projects submitted/implemented by the Investigators

5.1 Details of Projects submitted to various funding agencies:

S. No	Title	Cost in Lakh	Month of submission	Role as PI/Co-	Agency	Status
1	PI	10000-500000	August 2021	COPI	Unath bharath abhiyan Rural India	ongoing
2	COPI	650000	June 2017	Mentor	AICTE	ongoing

5.2 Details of Projects under implementation:

S. No	Title	Cost in Lakh	Start Date	End Date	Role as	Agency
1	Unath bharath abhiyan Rural India	10000-500000	August 2021	December 2024	R &D cell incharge	ongoing

5.3 Details of Projects completed during the last 5 years:

S. No	Title	Cost in Lakh	Start Date	End Date	Role as	Agency
1	AICTE-Research Promotion Scheme entitled "Development of solvent free and economically viable process for novel isatin derivatization and cytotoxic evaluation,"	6500000	June 2016	September 2021	COPI	AICTE
2.	UGC-Major Research Project entitled "Eco-design of Isatin derivatization under solvent free condition and evaluation for anticancer and antimitotic	1150000	June 2014	September 2017	PI	UGC

	activity"					

6. List of facilities being extended by parent institution(s) for the project implementation.

6.1. Infrastructural Facilities

Sr. No.	Infrastructural Facility	Yes/No/ Not required Full or sharing basis
1.	Workshop Facility	Yes
2.	Water & Electricity	Yes
3.	Laboratory Space/ Furniture	Sharing
4.	Power Generator	Yes
5.	AC Room or AC	Yes
6.	Telecommunication including e-mail & fax	Yes
7.	Transportation	Yes
8.	Administrative/ Secretarial support	Sharing
9.	Information facilities like Internet/Library	Yes
10.	Computational facilities	Yes
11.	Animal/Glass House	Yes
12.	Any other special facility being provided	Yes

6.2 Equipment available with the Institute/ Group/ Department/Other Institutes for the project:

Equipment current usage of available with equipment	Generic Name of Equipment	Model, Make & year of purchase	Remarks including accessories available and
PI & her group	UV-Vis spectrophotometer	Shimadzu 2011	Uv lamp Detector Cuvettes
	HPLC	Shimadzu 2010	Pumps Columns Syringes
	Dissolution apparatus	Lab india 2011	Beakers Paddles Mesh
	Disintegration apparatus	Lab india 2011	Beakers Paddles Mesh
	Sonicator	Lab india 2011	Beakers Mesh
	Soxhlet apparatus	Cisco 2011	Condenser Conical flask

	Distillation unit	2011	Round bottom flask Condenser
PI's Department	Research and development cell	Animal house committee 2011	
Other Institute(s) in the region	OU University JNTU university NIN Hyd	Collaborated	

7. Name and address of experts/ institution interested in the subject / outcome of the project.

Dr. G. Krishna Mohan

Professor

JNTUH

Hyderabad, Telangana

Dr. B. Chandra Shekar

Principal

St. Pauls College of Pharmacy

Sy.No.603 & 605,, Hyderabad - Nagarjuna Sagar Rd, Turkayamjal, Telangana 501510

Dr. M. Kiranmai Mandava

Vice Principal

St. Pauls College of Pharmacy

Sy.No.603 & 605,, Hyderabad - Nagarjuna Sagar Rd, Turkayamjal, Telangana 501510

Outcome

The nanocoated masks will have improved aesthetic value and ecofriendly with comfort and ease in use. Not only that the pocket oxygen inhalators will address the future needs in preventing the spread of microbial or viral infections. Definitely this proposal intervention will serve as the national interest under health security if nation. The formulation of nanocoated masks and pocket oxygen inhalators is innovative which prevents the entry of microbes through nasal and oral routes. Further the design of the nanocoated masks would prevent the suffocation problems by its

transparent design and porous nature. The nanocoatings will act as antiviral that prevents the entry of microbes. The proposal is novel and would address protection and extensive use due to its ease in aesthetic value for preventing communicable disease including pandemic in the near future. The research will address the objectives of national health security mission.

Institution wise Budget Breakup :

Budget Head	St. Pauls College of Pharmacy	Total
Manpower	1,90,125	1,90,125
Consumables	1,47,711	1,47,711
Travel	3,00,000	3,00,000
Equipment	17,00,280	17,00,280
Contingencies	2,70,000	2,70,000
Other cost	1,50,000	1,50,000
Overhead	80,000	80,000
Total	**28,38,116**	**28,38,116**

Institute Name : *St. Pauls College of Pharmacy*

Year Wise Budget Summary (Amount in INR) :

Budget Head	Year-1	Year-2	Year-3	Total
Manpower	63,375	63,375	63,375	1,90,125
Consumables	49,237	49,237	49,237	1,47,711
Travel	1,00,000	1,00,000	1,00,000	3,00,000
Equipments	17,00,280	0	0	17,00,280
Contingencies	50,000	50,000	1,70,000	2,70,000
Other cost	50,000	50,000	50,000	1,50,000
Overhead	50,000	10,000	20,000	80,000
Grand Total	**20,62,892**	**3,22,612**	**4,52,612**	**28,38,116**

Manpower Budget Detail(Amount in INR) :

Designation	Year-1	Year-2	Year-3	Total
Project Assistant	10,000	10,000	10,000	30,000
Research Associate-I	35,000	35,000	35,000	1,05,000
Technical Assistant	18,375	18,375	18,375	55,125

Consumable Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
	49,237	49,237	49,237	1,47,711

Travel Budget Detail (Amount in INR) :

Justification (Month Period)	Year-1	Year-2	Year-3	Total
	1,00,000	1,00,000	1,00,000	3,00,000

Equipment Budget Detail (Amount in INR) :

Generic Name, Model No., (Make) Justification	Quantity	Sparc Year	Estimated Cost
NanoSight NS300 NS300 (Malvern Panalytical NanoSight)	1	50 %	12,00,000
Empty nasal inhalers for nebulizer is (Cornucopia)	1	100 %	280
Aerosol Generator -Polydisperse Particles 1-6 Laskin Dispenser - Inbuilt Compressor 3450A (SKU: 3079A)	1	80 %	5,00,000

Contingency Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
	50,000	50,000	1,70,000	2,70,000

Overhead Budget Detail (Amount in INR) :

Justification	Year-1	Year-2	Year-3	Total
	50,000	10,000	20,000	80,000

Other Budget Detail (Amount in INR) :

Description Justification	Year-1	Year-2	Year-3	Total
samples for testing in reputed Covid laboratories The expenses for the field visits, study and experiments, any consumable item for the equipment handling and discharges for other are included	50,000	50,000	50,000	1,50,000

PROFORMA FOR BIO-DATA (to be uploaded)

1. Name and full correspondence address Dr. SNEHA THAKUR
   H. NO- 3-1-5/E/A, New shiv puri colony, Road no-1,
   L.B nagar, Hyderabad-500074, Telangana.
2. Email(s) and contact number(s) snehathakur2189@gmail.com, 919032783548
3. Institution St. Pauls College of Pharmacy, Turkayamjal, Hyderabad
4. Date of Birth 21-07-1989
5. Gender (M/F/T) Female
6. Category Gen/SC/ST/OBC OC
7. Whether differently abled (Yes/No) NO
8. Academic Qualification (Undergraduate Onwards)

	Degree	Year	Subject	University/Institution	% of marks
1.	Ph. D	2021	Pharmaceutical sciences	JNTUH	-
2.	M. Pharmacy	2013	Pharmacognosy	CPS, IST, JNTUH	87.4
3.	B. Pharmacy	2011	Pharmacy	BNPCW, Hyd	83.8
4.	Intermidiate	2006	Bipc	Sri Chaitanya junior college, hyd	91.1
5.	SSC	2004	Science maths and social	St. Domnics high school, Hyd	89.1

9. Ph.D thesis title, Guide's Name, Institute/Organization/University, Year of Award.

Ph.D thesis title: Green Synthesis Of Silver Nanoparticles And Screening For Pharmacological Activities
Guides name: Dr. G. Krishna Mohan
University : CPS,IST, JNTUH
Year of Award: 2021

10. Work experience (in chronological order).

S.No.	Positions held	Name of the Institute	From	To	Pay Scale
1	Associate professor	St. Pauls college of pharmacy	7/2021	present	Grade pay 6 as per State Govt
2	Assistant professor	Bojjam narasimhulu pharmacy college for women	2014	2021	Grade pay 4 as per State Govt
3	Graduate trainee	CSIR -CIMAP	2012	2014	-

11. Professional Recognition/ Award/ Prize/ Certificate, Fellowship received by the applicant.

S.No	Name of Award	Awarding Agency	Year
1.	Best poster award	Indo malaysian conference	2019
2.	Best oral award	OU university international conference	2014

12. Publications *(List of papers published in SCI Journals, in year wise descending order).*

S.No.	Author(s)	Title	Name of Journal	Volume	Page	Year
1	Shalini Tirunagari, Sneha Thakur, A. Niranjan Kumar, J. Kotesh Kumar, G. Krishna Mohan;	Phytochemical Exploration, and their Biological Evaluation from the stem bark of Alangium salvifolium	International Journal of Pharma and Bio Sciences,	Sepesial issue	238-243	2014
2	Yakaiah Chinthala, Shalini Tirunagari, Sneha Thakur, Srinivas Chinde, Anand kumar Domatti, J. Kotesh Kumar, Paramjit Grover; European Journal of Medicinal Chemistry,	Synthesis, docking and ADMET studies of novel chalcone triazoles for anti-cancer and anti-diabetic activity	European Journal of Medicinal Chemistry	93	564-573	2015
3	Sneha Thakur, Shalini Tirunagari, A. Niranjan Kumar, J. Kotesh Kumar G. Krishna Mohan	Isolation, Characterization and Biological Evaluation of Bio Molecules from Enicostema axillare whole plant	Pharmacognosy Release bulletin	T-143	3	2015
4	Sneha Thakur*, Dr. P. Mani Chandrika, P. Krishnaveni, B. Kalpana,Y. Manisha, K. Lakshmi, E. Lalitha,	Formulation and Evaluation of Poly Herbal Antiseptic Powder forits Antimicrobial Activity	International journal of current trends in pharmaceutical research	3(5)	1019-1022	2015
5	Sneha Thakur, Krishna Mohan G, Sandhya Rani M,	Plant-Mediated Synthesis of Silver Nanoparticles – A Critical Review	International Journal of Pharmacognosy and Phytochemical Research	9(7)	947-956	2017
6.	Sneha Thakur, G.	Green Synthesis	International	5(4)	1-6	2018

	Krishna Mohan	Of Silver Nanoparticles Of Divya Churna And Evaluation Of Its In vitro Antibacterial And Antioxidant Activities	Journal of Research and Analytical Reviews			
7	Sneha Thakur, G. Krishna Mohan	Green synthesis of silver nanoparticles of boswellic acid and it's in vitro anticancer activity	International journal of pharma and biosciences	10(3)	93-100	2019
8	Sneha Thakur, G. Krishna Mohan	"Green Synthesis Of Silver Nanoparticles Of Onion DNA And Screening For In vitro Antityrosinase Activity	Asian Journal of Pharmaceutical and Clinical Research	12(9)	1-5	2019
9	Sneha Thakur, G. Krishna Mohan	Green Synthesis of Silver Nanoparticles of Onion DNA and Screening for it's in vitro Antibacterial and Anticancer Activity	Asian Journal of Ethnopharmacology and Medicinal Foods	5(4)	5-14	2019
10	Sneha Thakur, G.Krishna Bharathi, Yada harika, Varakantham Divya, Kavya Vupula, Bejawada Bhargavi	Screening Of Albizia Lebback Flower Methanolic Extract For Antiinflammatory And Anti Oxidant Activities	International Journal of Research and Analytical Reviews	6(1)	890-892	2019
11	Lekhana S, Kanishka B, Sneha Thakur*,	Nucleic Acid Nanostructures–DNA and RNA Nanoparticles,	International Journal of Pharmacognosy and Phytochemical Research.	12(2)	94-102	2020

12	Sneha Thakur, G. Krishna Mohan	Anticancer Activity of Onion DNA Silver Nanoparticles on A549, MCF 7 Cell Lines and in vitro Drug Release Kinetics	Applied nanoscience	Under review	-	2021
13	Sneha Thakur, G. Krishna Mohan	Invivo Antiinflammatory Activity Of Boswellic Acid Silver Nanoparticles And In Vitro Drug Release Kinetics	Bionanoscience	Under final review		
14	Dr. Kiranmayee. Avinash, Anusha,PRtibha, Dr. Sneha Thakur	Covid-19 Induced Diabetes: Disclosing Truth Behind The Potential Attention Seeker: Sars-Cov-2 Induced Type-1 Diabetes Mellitus	Journal of young pharmacists	Under final review		

13. Detail of patents.

S.No	Patent Title	Name of Applicant(s)	Patent No.	Award Date	Agency/Country	Status
	Yet to be applied for the Ph. D work					

14. Books/Reports/Chapters/General articles etc.

S.No	Title	Author's Name	Publisher	Year of Publication
	Not yet			

15. Any other Information (maximum 500 words)
Enthusiastic learner and keen observer. Strong motivation and research driven attitude are my assets.
IPR certification on Patents and PCT from WIPO Academy, Geneva

Certificate from the Investigator

Project Title: **MULTIPURPOSE ANTIVIRAL NANOCOATED POROUS MASKS AND POCKET OXYGEN INHALERS**

It is certified that

1. The same project proposal has not been submitted elsewhere for financial support.

2. We/I undertake that spare time on equipment procured in the project will be made available to other users.

3. We/I agree to submit a certificate from Institutional Biosafety Committee, if the project involves the utilization of genetically engineered organisms. We/I also declare that while conducting experiments, the Biosafety Guidelines of Department of Biotechnology, Department of Health Research, GOI would be followed in toto.

4. We/I agree to submit ethical clearance certificate from the concerned ethical committee, if the project involves field trails/experiments/exchange of specimens, human & animal materials etc.

5. The research work proposed in the scheme/project does not in any way duplicate the work already done or being carried out elsewhere on the subject.

6. We/I agree to abide by the terms and conditions of SERB grant.

Name and signature of Principal Investigator : 23/09/2021

Date:23-9-2021
Place: St. Pauls college of Pharmacy

Name and signature of Co-PI (s): M. Agitha
Date: 22.9.2021
Place: JNTUH

Undertaking by the Principal Investigator

To

The Secretary
SERB, New Delhi

Sir

I Dr. Sneha Thakur herby certify that the research proposal titled "MULTIPURPOSE ANTIVIRAL NANOCOATED POROUS MASKS AND POCKET OXYGEN INHALERS" submitted for possible funding by SERB, New Delhi is my original idea and has not been copied/taken verbatim from anyone or from any other sources. I further certify that this proposal has been checked for plagiarism through a plagiarism detection tool i.e. Grammarly's plagiarism checker approved by the Institute and the contents are original and not copied/taken from any one or many other sources. I am aware of the UGCs Regulations on prevention of Plagiarism i.e. University Grant Commission (Promotion of Academic Integrity and Prevention of Plagiarism in Higher Educational Institutions) Regulation, 2018. I also declare that there are no plagiarism charges established or pending against me in the last five years. If the funding agency notices any plagiarism or any other discrepancies in the above proposal of mine, I would abide by whatsoever action taken against me by SERB, as deemed necessary.

Sneha 23/09/2021

Signature of PI with date
Dr. SNEHA THAKUR
Associate Professor

St. Pauls
College of Pharmacy

(Approved by AICTE - PCI & Affiliated to Osmania University)

Endorsement from the Head of the Institution of PI

This is to certify that:

1. Institute welcomes participation of Name: Dr. Sneha Thakur Designation: Associate professor as the Principal Investigator and Dr. M. Ajitha, Professor and Deputy Director AAC JNTUH as the Co- Investigator/s for the project titled and that in the unforeseen event of discontinuance by the Principal Investigator, the Co-Investigator will assume the responsibility of the fruitful completion of the project with the approval of SERB.
2. The PI, Dr. Sneha Thakur is a permanent or regular employee of the St. Pauls College of Pharmacy and has eight years of regular service left before superannuation
3. The project starts from the date on which the St. Pauls College of Pharmacy Institute receives the grant from SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi.
4. The investigator will be governed by the rules and regulations of OU University and will be under administrative control of the St. Pauls College of Pharmacy Institute for the duration of the project.
5. The grant-in-aid by the SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi will be used to meet the expenditure on the project and for the period for which the project has been sanctioned as mentioned in the sanction order.
6. No administrative or other liability will be attached to SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi at the end of the project.
7. The St. Pauls College of Pharmacy will provide basic infrastructure and other required facilities to the investigator for undertaking the research project.
8. The St. Pauls College of Pharmacy will take into its books all assets created in the above project and its disposal would be at the discretion of SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi.
9. The St. Pauls College of Pharmacy assumes to undertake the financial and other management responsibilities of the project.

Date: 29-09-2021

St. Pauls College of Pharmacy Turkayamjal R.R. Dist-501 510

Principal
Principal
St. Paul's College of Pharmacy
Turkayamjal, R.R District

Sy.Nos 603 & 605, Adj. to Turkayamjal Village, Sagar Road, Hayathnagar Mandal, R.R. Dist., Telangana State, Pin: 501510
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ACCREDITED BY NAAC
A GRADE

CENTRE FOR PHARMACEUTICAL SCIENCES
INSTITUTE OF SCIENCE AND TECHNOLOGY
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

(Established by Govt. Act No. 30 of 2008)
Kukatpally, Hyderabad – 500 085, Telangana (India)

Dr.M.AJITHA
M.Pharm,Ph.D.
Professor & Head

Date: 22-09-2021

Endorsement from the Head of the Institution of Co-PI

This is to certify that:

1. Institute welcomes participation of Name: Dr. Sneha Thakur Designation: Associate professor as the Principal Investigator and Dr. M. Ajitha, Professor and Deputy Director AAC JNTUH as the Co- Investigator for the project titled "MULTIPURPOSE ANTIVIRAL NANOCOATED POROUS MASKS AND POCKET OXYGEN INHALERS" and that in the unforeseen event of discontinuance by the Principal Investigator, the Co-Investigator will assume the responsibility of the fruitful completion of the project with the approval of SERB.
2. The Co-PI, Dr. M. Ajitha is a permanent or regular employee of this Institute/University/Organization and has sixteen years of regular service left before superannuation
3. The Co-PI will be governed by the rules and regulations of JNTUH University and will be under administrative control of the Center for Pharmaceutical Sciences
   Institute of Science & Technology(IST) for the duration of the project.
4. The grant-in-aid by the SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi will be used to meet the expenditure on the project and for the period for which the project has been sanctioned as mentioned in the sanction order.
5. No administrative or other liability will be attached to SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi at the end of the project.
6. The JNTUH University will provide basic infrastructure and other required facilities to the investigator for undertaking the research project.
7. The JNTUH University will take into its books all assets created in the above project and its disposal would be at the discretion of SCIENCE & ENGINEERING RESEARCH BOARD (SERB), New Delhi.
8. The JNTUH University assumes to undertake the financial and other management responsibilities of the project.

Date: 22-09-2021

Head of organization

HEAD
CENTRE FOR PHARMACEUTICAL SCIENCES
JNTU Institute of Science & Technology
Kukatpally, Hyderabad