

Indian Science Technology and Engineering facilities Map

(I-STEM)

Invites application for

1. Partial financial support for using R&D facilities in other institutions through the I-STEM web portal to Users from Academic Institutions and Start-ups (Format-1)

Format for requesting support for accessing and using facilities through the I-STEM web portal.

(i) Details of the Personal Information

- a. Name of the Researcher/~~Faculty Member~~: Asha Humbal
- b. Name of the Institution/~~Start-up~~: Central University of Gujarat
- c. Name of the Department: School of Environment and Sustainable Development
- d. Degree registered for/Product being developed (for start-up): Ph.D.

(ii) Project/Research topic Details:

a. Project Title/Research Title: Harnessing the potential of selected medicinal plants and its use for synthesis of nanoparticles for effectiveness of bioactivities

b. Sub area: Bionanotechnology

c. Area Description: Saurashtra and south Gujarat (collection of medicinal plant)

Green synthesis of nanoparticles has attained much interest because of their safe nature, environmentally benign, ease in manufacturing, and low production cost. It is a reliable process for developing a wide array of nanoparticles and also provided promising and sustainable alternative approach to conventional synthesis approaches. The concept was undertaken in the study to bridge the gap between indigenous knowledge and advanced therapeutic practices. The advancement in green synthesis of nanoparticles using natural compounds such as plant extracts and anticipated activity has been proposed for more refined results.

d. Aims & Objective (in Bullets):

Aim

- Phytochemical study of selected medicinal plants with special reference to enhance effectiveness of medicinal properties using bio-nanotechnological approaches

Objectives

- Phytochemical characterization of selected medicinal plant species
- To evaluate antioxidant, antimicrobial, and cytotoxic activity of selected medicinal plant species
- Synthesis and characterization of nanoparticles from selected plant species
- Application of phytosynthesized nanoparticle for enhancing bioactivities

e. Duration (MM/YYYY): 3 years

f. Project Summary (1000 words): The proposed study mainly aims to use modern nanotechnology for the generation of plant-based nanoparticles having improved biomedical applications. Broadly the study focuses on two parts. First, characterization of various phytochemical constituents of selected medicinal plants. Second, preparation of plant-based nano-particle, and its characterization for having improved medicinal application. For the characterization of phytochemical compounds, specialized plant parts like leaf, root, stem, flower, and fruits will be used. The phytochemicals such as primary and secondary metabolites will be isolated using conventional extraction methods includes distillation, microwave-based extraction, and sonication-based extraction. Crucial properties of the extracted compound such as anti-oxidant activity, antimicrobial activity, and cytotoxic potential, will be performed using various biochemical and microbiological assays. This study will further help to identify the plant part containing useful bioactive compounds. The plant part showing high activity will be subjected to green synthesis-based nano-particle preparation. The nano-particles will be characterized using various techniques includes FT-IR, UV-spectroscopy, scanning electron microscopy, particle size analyzer, etc. Further, the nano-particle will be evaluated for its cytotoxicity and anti-microbial activity. Comparison of crude extract and nano-particles for their bioactivity will help to design nano-particles with better bioactivity having its application in biomedical science. Overall, the proposed work aims to synthesize plant-based nano-particles using green synthesis, so, the side effect of conventional nano-particles and production cost of nano-particle can be reduced, and at the same time nano-particle with enhanced desired activity can be produced.

(Separate page may be attached to justify the requirements)

a. **Technical Details**

a. TRL:TRL 2

b. Methodology: Proposed work intimately tied with fieldwork followed by experimental work.

Sl. No.	Objective/Target	Proposed time period to achieve the given objective months/years
1.	(A) Phytochemical characterization of selected medicinal plant species (Gujarat Region) (B) To evaluate antioxidant, antimicrobial, and cytotoxic activity of selected medicinal plant species (Gujarat Region)	12 Months
2.	(C) Synthesis and characterization of nanoparticles from selected plant species (D) Application of phytosynthesized nanoparticle for enhancing bioactivities	12 Months

c. Design & development: NA

d. Facilities and Instrumentation required: HPLC, HPTLC , FTIR, PSA, DLS, SEM, TEM, BET, TGA

e. Consumables (Scientific materials) : NA

13. Expected output and outcome

- Characterization of phytoconstitute of selected medicinal plant
- Bioactive properties of selected medicinal plant
- Development of nanoparticles from plant and their effectiveness for enhancing bioactivities

14. Industry/Institute Collaboration

If, yes

- (i) Name of the Collaborating Industry/Institute
- (ii) Collaboration Details
- (iii) Additional Details if any

15. Funding required from I-STEM (with justification:

Details of Requirements & Mode of the Engagement: (Attach the quotation for the consumables)

(i) Short term Engagement:

- a. Usage of testing/characterization facilities across the country (Characterization Mode)
 - i. Testing Charges
 - ii. Consumable charges
 - iii. Travel Cost (Boarding and Lodging, if any)
- b. Usage of fabrication and testing facilities across the country (Fabrication Mode)
 - i. Fabrication and testing Charges
 - ii. Consumable charges (if any)
 - iii. Travel Cost (Boarding and Lodging, if any)

(ii) Medium term Engagement:

- a. Execution of project in any one of the Host Institution (Project Mode)
 - a.Fabrication and or testing Charges
 - b.Consumable charges (if any)
 - c.Travel Cost (Boarding and Lodging, if any)
- b. Execution of project in Multi Host Institutions (Project Mode)
 - a.Fabrication and or testing Charges
 - b.Consumable charges (if any)
 - c.Travel Cost (Boarding and Lodging, if any)

(Round-trip to the Host Institution by 2nd class (Non-AC) railway via the nearest route)

Details of User's Bank Account: 5999101001026

(Please send a copy of the cancelled cheque/copy of the passbook carrying all the information needed)

Beneficiary Name (User's name): Asha Humbal

PAN: -

Bank Account No. 5999101001026

Name of the Branch: Canara Bank, sector 29, Central University of Gujarat

IFSC Code: CNRB0005999

Note: Proposed proposal must be executed within stipulated duration (max. 6 month) to avoid fund availability issues. Travel form will be provided by the I-STEM office. The users will submit the technical report, original invoice (duly signed by the Head of the Institution) raised by the Host Institution through I-STEM portal only along with a copy of the travel forms and original tickets through post to the Nodal Officer, I-STEM, Indian Institute of Science, Bangalore. A scan copy of all the documents may be sent in advance.