

CREATORS

Newsletter of BIONEST- IASST (In association with ISVEC)

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2021

Editor's Desk

I am indeed happy to bring the October 2021 Issue of the newsletter Creators. It is well known that the essence of excellence in science and technology relies on massive collaborative efforts, and the researchers, scientists, distinguished speakers, and faculty fraternity of IASST have contributed tremendously to the compilation of this newsletter. This newsletter includes specific emphasis on the various events and workshops conducted from time to time on various topics of interest and to commemorate significant events such as Youth Skill Day, Preservation of the Ozone Layer, Photography Day, and International Heart Day. The articles contained in this volume addressed various aspects of Entrepreneurship, Waste-to-value, Biomaterials, and Biodiversity. Last but not the least, I extend my sincere thanks to the editorial team for their generous commitment of time and support in compiling the current issue.

Editor

Prof. Ashis Kr. Mukherjee

DIRECTOR-IASST, Ghy-35

Editorial Team:

Dr. Devasish Choudhury, Dr. Tania Paul Das,

Dr. T. D. Goswami, Mr. Nayan Talukdar, Mr. Minku Das



Events & workshops at IASST

World Youth Skills Day held on 15th July 2021.

World Youth Skills Day with the theme “Reimagining Youth Skills Post-pandemic” was organized by the IASST, Guwahati to encourage youth to take up industry relevant skill training and to learn the importance of e-commerce that can help them to secure a better livelihood. Inaugural address was delivered by the honorable Director of IASST Dr. Ashis Kumar Mukherjee, who insisted on the role of young minds in shaping the economic landscape of the country. The invited speaker for the first session was Mr. Amitava Banerjee IICA -MCA assessed eligible Independent Director and former consultant of National Foundation for Corporate Governance, Govt. of India and discussed on 'E-commerce for business beyond borders and its necessity in Northeast'. He elaborated on the government's policy and the rich availability of the natural resources for e-commerce applications. The invited speaker for the second session was Dr. Pijush Chandra Das, Deputy Director of Training & Placement, Tezpur University and he discussed 'Placement Guidelines & Personality Development'.

In-house talk by Prof. Neelotpal Sen Sarma held on 4th August 2021.

Dr. Neelotpal Sen Sarma gave a talk on Polymer behind all good and bad things. He discussed about various forms of natural as well as artificial polymers and their uses as photoluminescence indicators and sensors. He also discussed about liquid crystalline polymers and its use in a variety of fields of new devices, energy, environment, resources and biotechnologies.

Independence Day (Celebrating 75th Year of India's Independence-2021)

IASST has celebrated Independence Day 2021 under the banner “Azadi Ke Amrit Mahotsava” with great enthusiasm and patriotic fervor. The program started with tricolor flag hoisting by Prof. Ashis K. Mukherjee, Director, IASST followed by the national anthem. While addressing the gathering appealing to their nationalistic spirit, the Director urges them to take pride in being an Indian and fulfilling one's duty with responsibility for the country's holistic development. He also emphasized the necessity of women's empowerment and autonomy for the progress of the country. In his speech, the Director highlighted some salient features of the New Education Policy 2020 and stated the need of the hour to transform the Indian universities as multidisciplinary learning and research centers to provide meaningful, localized solutions to the country's problem. The Director opined that our students should think from a citizen-centric perspective and inculcate greater societal values and research culture. Followed by this, IASST felicitated two persons-one retired school teacher and another entrepreneur who has contributed to society in their respective fields. Further, certificates and prizes were distributed to winners of the Slogan writing competition and essay writing competition organized among the research scholars of the institute and the school students from class VIII to X in Assam, respectively. The Director, IASST inaugurated a children's park in the IASST campus.

World Photography Day on 19th August 2021

IASST celebrated World Photography Day on 19th August 2021 via online mode with the theme “Surrounding Environment through the lens”. Introductory speech and inauguration of the virtual Photography Exhibition was done by Prof. H. Bailung, Head, Physical Sciences Division, IASST. Followed by this, the invited member Mr. Himadri Bhuyan, Senior Photographer, Nikon India Mentor for North East Region was requested to deliver a talk.

Amongst 134 unique photographs submitted for the photography competition by the scholars and staffs of IASST, 4 photographs were selected for consolation prizes and one each for 3rd Prize, 2nd Prize and 1st prize



Prakash K Kachari (1st Prize)



Devabrat Sharma (2nd Prize)



Hridoy Jyoti Bora (3rd Prize)

Consolation Prizes



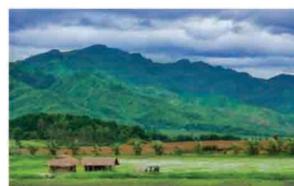
Bidyut Chutia



Chingtham T Singh



Devi Basumatary



Chingtham T Singh

Events & Workshops at IASST

In-house talk by Dr. Arup Ratan Pal held on 31st August 2021

Dr. Arup Ratan Pal, Associate Prof-II, Advanced Material Science (PSD) delivered a talk on Plasma polymerization. He discussed on the application plasma polymers in corrosion resistant coatings, Decorative coatings, Anti-reflection coatings, hydrophobic & hydrophilic coating, antimicrobial coating, biocompatible coating and thin films for optoelectronic devices.

Invited talk by Prof. Sandeep Kumar held on 13th September 2021

In National Lecture Series at IASST on occasion of National celebration of 75th year of India's Independence-Azadi Ka Amrit Mahotsava, an invited lecture was given by Prof. Sandeep Kumar, Former Professor, Raman Research Institute, Bangalore on September 13, 2021.

The title of his talk was "Supramolecular Nanocomposites as Advanced Materials for Opto-electronics". He in his talk gave a beautiful description about fundamental of liquid crystals and various Discotic liquid crystals system prepared by his group over the last few decades. He also described his recent research on discotic liquid crystal nanocomposite and its applications in photovoltaics and solar cell.

International Day for the preservation of Ozone Layer 16th September 2021

IASST has celebrated the International Day for the Preservation of Ozone. The program's theme was "Montreal Protocols- Keeping us, our food, vaccines cool". Prof. B. N. Goswami, SERB Distinguished Fellow and an eminent scientist in the field of meteorology and climatology, has delivered a talk entitled "The Ozone Hole & the Success of the Montreal Protocol: Challenges ahead & contrast with the Paris Agreement". Prof. Goswami has explained details about the ozone layer, how it protects our planet from UV radiation, depletion of the Ozone layer in the Antarctic region, Montreal protocol and its success in recovering the ozone layer.

Invited talk by Prof. Anupam Chatterjee on 17th September 2021

Prof. Anupam Chatterjee, Dept. of Biotechnology & Bioinformatics, North Eastern Hill University (NEHU), Shillong, delivered a lecture at IASST on the topic "The systemic adverse effects of Areca-nut: Evaluation of Carcinogenic Risks and Its Early Detection" through offline and online mode. Prof. Anupam Chatterjee is an academician who has been engaged in translating molecular human genetics research and training in the areas of healthcare improvement and innovations. He is a trained geneticist at Banaras Hindu University, Gray laboratory- UK, University of Columbia- USA and Swansea University- UK.

In the North-eastern states of India, incidences of oral and esophageal cancers are eminently high. In Meghalaya, areca nut is consumed raw, in an unprocessed form along with lime paste and a small betel leaf. International Agency for Research on Cancer (IARC) has categorized areca nut as a Group 1 carcinogen. Prof Chatterjee has explained how areca-nut caused cancer and he has revealed through in vivo experiments. His significant contribution unravels the molecular etiology and cellular mechanisms causing oral/esophageal cancer by observing higher chromosome mis-segregation in early carcinogenesis and proposed the importance of precocious anaphase as a screening marker for mitotic check-point defects. Their group has established that over-expression of genes like p53 and Securin play an important role in carcinogenesis.

In-house talk by Dr. Devasish Chowdhury on 22nd September 2021

An in-house talk of the lecture series "Talks by Scientists at AI" was delivered by Dr. Devasish Chowdhury, Associate Professor and Vigilance Officer of IASST Guwahati. He opined that -Today the Public Sector Organization (funded by the Government of India) in the country plays a significant role in the economic as well as social development of the country. They deal with taxpayers' money and are therefore should be accountable. IASST being an autonomous institute under the Department of Science and Technology, Government of India, the same responsibility is bestowed upon the institution. Dr. Chowdhury talked about vigilance and its importance in R&D set-up. Vigilance means sensing, probing, and interpreting weak signals from both inside and outside the organization. The talk covered various lapses that can take place in an organization and how they can be avoided. Dr. Chowdhury appealed to the IASST fraternity to be vigilant and extend all co-operation to the administration in making corrupt-free Institution.

World Heart Day on 29th September 2021

IASST celebrated World Heart Day at the premise and the program initiated with Health check up for all the employees. It was followed by scientific presentation by the honourable Director-Prof. Ashis Kr. Mukherjee on "Therapeutic application of snake venom & plant derived anti-coagulant compounds for the treatment of thrombosis associated cardiovascular disorder."

Dr. Mojibur Khan gave a talk on "Microbiome and cardiovascular disease." Dr. Rajlakshmi Devi gave a talk on "Role of Herbal medicine in cardiovascular disease". Invited speaker post lunch session was Dr. Amiya Kumar Sarma; MD Internal Medicine, FISCU (USA), FIAE, Director & Chief Consultant, Senior Medical Specialist and Clinical cardiologist and currently Medical Consultant at 3D Healthcare, Beltola. He delivered a talk on "**Prevention of Coronary Heart Disease**" at 3:00 pm in both online and offline mode in the occasion of World Heart Day as part of National celebration of 75th year of India's Independence-"Azadi Ka Amrit Mahotsav"

Banana pseudo stem fibre- a novel suture material to combat post operative wound infections.

-Dr. Rajlakshmi Devi

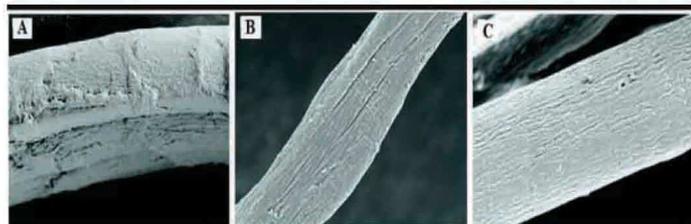
HOD of Life Science Division, IASST-Ghy-35

Introduction: The search to develop an ideal suture material encourages us to explore novel suture biomaterials with superior characteristics to the current commercially available products. Surgical sutures play a crucial role in the development of post-operative wound infection by acting as a substrate for biofilm formation which leads to dehiscence wounds. In this context, the present invention meets this need by fabricating banana (*Musa balbisiana*) fibre into an advanced antimicrobials releasing suture biomaterial (BSc) for the prevention of post-operative wound infection. Suture material developed from banana pseudo stem fiber was impregnated with chloramphenicol, clotrimazole and growth factors with the aid of a hydro-gel system. The fabricated suture material was found to be biocompatible towards human erythrocytes and L929 mouse fibroblast cells. BSc exhibited promising physico-chemical characteristics which were comparable to the commercially available *Bombyx mori* silk fibroin (BMSF) suture.

Suture fabrication and drug impregnation: Raw banana fiber was washed thoroughly to remove the dirt, air dried, and then degummed in 2% NaOH solution (at a fiber to NaOH ratio of 1:7) at 95 °C for 120 min. After degumming the fiber was washed to remove the traces of NaOH and dried. Later this was sterilized in autoclave and kept in a desiccator prior to use. The coating material was prepared by dissolving 4.4% of the antimicrobial agents (chloramphenicol and clotrimazole at 9:1), nerve growth factor (250 ng ml⁻¹) and epithelial growth factor (1 ng ml⁻¹) (Sigma, USA) in a mixture of 0.1% hydrogel base. The hydrogel consisted of AV and GA. AV is a semi liquid gel, whereas GA is a natural adhesive agent, together both the materials help the successful impregnation of drugs onto the surface of the suture material. The braided, sterilized banana suture was dip-coated in the coating material and dried at 37 °C for 24 h to form the advanced antimicrobials releasing suture biomaterial (BSc).

Physico-chemical characterization of the BS and BSc: The surface morphology of the raw, degummed and antimicrobial impregnated banana fibers was observed using a field emission scanning electron microscope (FESEM) (Carl Zeiss, SIGMAVP, Japan). The elemental analyses of the above mentioned fibers were determined by using Energy-

dispersive X-ray spectroscopy (EDX) (INCA X-Max 250). Functional group analysis of all the fibers (raw, BS and BSc) was performed using attenuated total reflection-Fourier transform infrared spectra



(ATR-FTIR) (NICOLET, Thermo Scientific, USA) and compared with the commercially available suture material *Bombyx mori* silk fibroin (BMSF). Thermo gravimetric analysis (TGA) (Perkin Elmer TGA-4000, USA) was used to determine the thermal stability of the sutures. The tensile strength of the sutures (BMSF suture, raw suture, BS, and BSc) was determined using a tensiometer (Instron tensile tester 3343).

Biocompatibility study: To determine the toxicity of the prepared sutures towards mammalian cells the following tests were conducted.

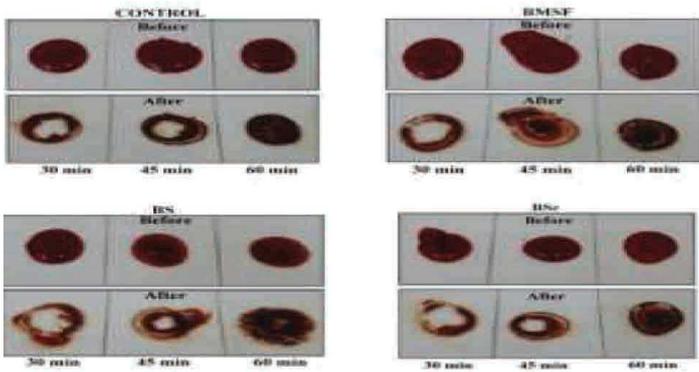
•**Hemocompatibility:** The sutures were incubated with 10 ml of blood (blood and PBS in 1:9) for 1 h at 37 °C. After 1 h the tubes were centrifuged and the optical density of the supernatant was measured at 545 nm using a UV-spectrophotometer



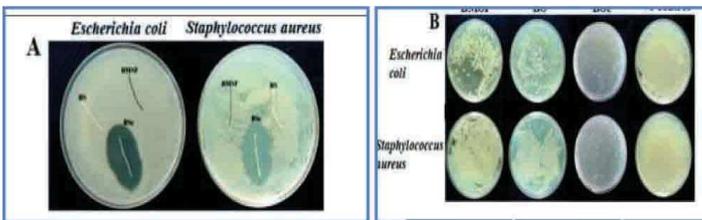
•**Effect on morphology of human erythrocyte:** Suture materials were incubated with mammalian erythrocyte and its morphology was observed under FESEM.

•**Cytocompatibility:** For the cytotoxicity measurement MTT assay was performed against a L929 mouse fibroblast cell line.

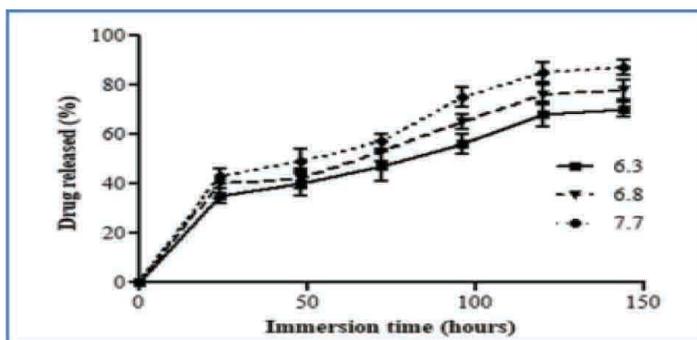
In vitro anti-thrombogenic assay: Anti-coagulant (citrate dextrose) treated blood was incubated with BMSF, BS, and BSc in different micro centrifuge tubes for 1 h at 37 °C to see the anti thrombogenic efficacy.



Antimicrobial testing: The antimicrobial activities of the BMSF, BS, and BSc were evaluated against Gram-positive *Staphylococcus aureus* (MTCC3160), Gram-negative *Escherichia coli* (MTCC40), and opportunistic fungus *Candida albicans* (MTCC3958) by using the standard agar diffusion method and direct contact test method.

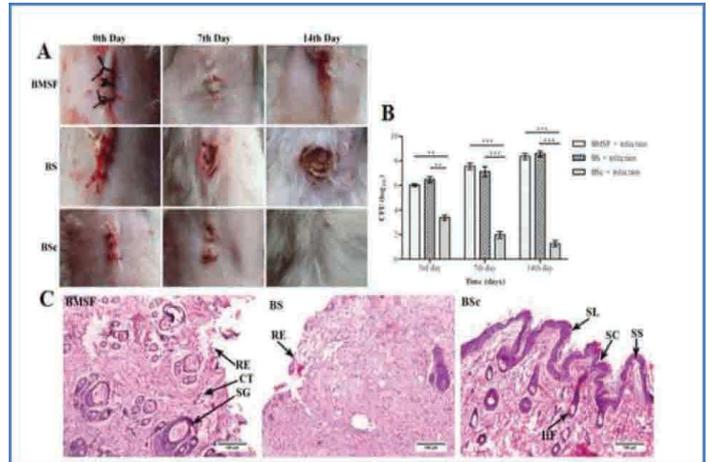


In vitro drug release assay: The release profile of the antimicrobial drug (chloramphenicol) was assessed in PBS with pH 6.3, 6.8, and 7.7, corresponding to different skin pH values from relatively low to high pH during wound healing. Suture (10 cm) was placed in micro centrifuge tubes containing 1.33 ml of the buffers and kept at 37 °C under continuous shaking (60 rpm). At different time intervals (24, 48, 72, 96, 120 and 144 h), an aliquot of 150 μ l was recovered to measure the absorbance of each sample by using a Multimode Reader, VARIOSKAN FLASH at different wavelengths of 290 nm (pH 6.3), 289 nm (pH 6.8), and 287 nm (pH 7.7). At the same time an equal volume of PBS was added to the each of the micro centrifuge tubes. The release percentage was calculated as the ratio of drug released at subsequent times to the amount of drug loaded onto the sutures.

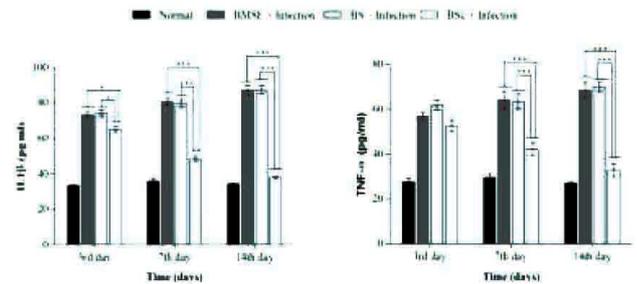


Wound healing efficacy of sutures.

(A) Healing progression of the *S. aureus* infected wounds sutured with BMSF, BS, and BSc on day zero, seventh, and 14th day.
 (B) CFU count data for the incised wound of the BMSF, BS, and BSc sutured animals at different time points.
 (C) Histopathological observation of the skin tissue sutured with BMSF, BS, and BSc on the 14th post-operative day.



Graph of Serum inflammatory cytokine levels IL-1 β & TNF- α on 3rd, 7th, and 14th day of surgery with and without treatment.



Conclusion: The findings of this study could potentially contribute towards the promotion of banana cultivators by adding value to the Agricultural waste.

This article is a part of the published article: H Kalita, A Hazarika, R Kandimalla, S Kalita, R Devi. Development of banana (Musa balbisiana) pseudo stem fiber as a surgical bio-tool to avert post-operative wound infections. RSC advances (2018) Vol: 8 (64), 36791-36801

*Butterfly biodiversity at IASST campus, Ghy-35
& some amazing facts about butterflies.*

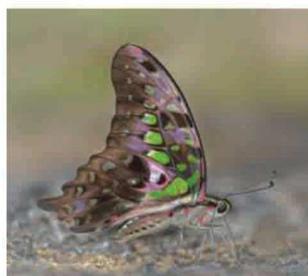
Dr. Tania Paul Das & Prakash Kr. Kachari



Common Mormon
Papilio polytes,
Family: Papilionidae



Great Mormon
Papilio memno,
Family: Papilionidae



Tailed Jay
Graphium gamemnon,
Family: Papilionidae



Common Birdwing
Troides helena
Family: Papilionidae



Golden Birdwing
Troides aeacus
Family: Papilionidae



Common Bluebottle
Graphium sarpedon
Family: Papilionidae



Common Hedge Blue
Acytolepis puspa
Family: Lycaenidae



Purple Sapphire
Heliophorus epicles
Family: Lycaenidae



Red Spot Jezebel
Delias descombesi
Family: Pieridae



Tailed Cupid
Cupido argiades
Family: Lycaenidae



Common Tit
Hypolycaena erylus
Family: Lycaenidae



Chocolate albatross
Appias lyncida
Family: Pieridae



Common Five Ring
Ypthima baldus
Family: Nymphalidae



Great Eggfly
Hypolimnas bolina
Family: Nymphalidae



Common Sergeant
Athyma perius
Family: Nymphalidae



Common Nawab
Polyura athamas
Family: Nymphalidae



Common Evening Brown
Melanitis leda
Family: Nymphalidae



Common Lascar
Pantoporia hordonia
Family: Nymphalidae



Common Crow
Euploea core
Family: Nymphalidae



Commander
Moduza procris
Family: Nymphalidae



Cruiser
Vindula dejone
Family: Nymphalidae



Punchinello
Zemeros flegyas
Family: Riodinidae



Common Flat
Sarangesa dasahara
Family: Hesperidae



Common Yeoman
Cirrochroa tyche
Family: Nymphalidae

DO YOU KNOW!!

- Butterflies are colorless & powdery coating in wing is tiny scales that reflect light.
- Butterflies don't have taste buds but have sensors in their feet.
- Butterflies have 6,000 lenses & see beyond UV spectrum.
- A butterfly known as Skipper can fly faster than a horse.
- Some species have false heads on their wings.
- Monarch butterflies travel over 2,500 miles.
- Most adult butterflies only live for 2-4 days.
- NER India has a record of 962 butterfly species.

- >90% of butterfly population vanished in last 25 years.
- They drink tears of some turtles and reptiles to get sodium.
- Costa Rica is a home of 10% of all the butterfly species in the world.
- The female caterpillars will only lay eggs on plants that can serve as hosts.
- Swallowtail butterfly caterpillars produce odor from osmeterium when threatened.
- The glue used by butterflies is so strong that it is impossible to detach the eggs from leaves.

- **Butterfly Park, Bengaluru** is the India's first butterfly park established over the area of 7.5 acres which has a butterfly trail of about 1 km length.
- **Butterfly Park, Shimla** is the second butterfly garden which is the home of about 300 species of butterflies over an area of 4.2 hectares
- **Butterfly Park, Asola Bhatti Wildlife Sanctuary , Delhi** is home to over 90 species of butterflies
- **Butterfly Reserve Park, Sikkim** is established in the year 2011 on 29 hectares field
- **Butterfly Park, Chandigarh** has flower beds for butterflies and a well constructed Shed
- **Butterfly Conservatory, Ponda, Goa** bred butterflies in endemic plants, clean air, and humus rich soil.
- **Ovalekar Wadi Butterfly Garden, Thane** is the home for 132 species of butterflies.
- **Thousand shades butterfly park Gurugram** has over 27 species of butterflies
- **The Butterfly Research Centre** near the Bhimtal Lake, Uttarakhand is the fourth largest butterfly and motl reference collection in India
- **Indian Foundation for Butterflies**, or IFoundButterflies, is established in the year 2009 which host the website, Butterflies of India.

“Entrepreneurship Awareness Camp” organized at BioNest- IASST

Entrepreneurship Awareness Camp was organized on 17th July 2021, Saturday, to give an exposure of entrepreneurship to the students and budding startups. Chandrabhan Kakoty (Manager –Incubation & Outreach) deliberated about BioNest- IASST and discussed on creating conducive environment towards developing entrepreneurship ecosystem. Prof. Ashis Kumar Mukherjee, Honorable Director of IASST gave the inaugural speech and motivated the participants towards becoming entrepreneurs. It was followed by the talk session by Mr. Walid H. Barbhuiya, (Founder of Lekh Vidhi) which was focused on types of Legal Entity and Basics of company formation for new generation entrepreneurs. Subsequently, Dr. Tania Paul Das gave an overview of the different sectors of incubation and funding support that one can avail to kick-start their entrepreneurial journey. A total of 186 participants registered for the event which was live streamed on youtube channel. The participants were invited & encouraged to get incubated at BioNest-IASST.

The major takeaway of the event is summarized below:

Entrepreneurship is the practice of designing, launching and running a new business. The basis of entrepreneurship is risk-taking appetite which inspires an individual to forego his or her comfort zone and nurture something in anticipation of future benefits or profits. The scope of entrepreneurship is vast as it can stimulate the economy which enables societal change not only for fulfilling a need but also to generate revenue for the entrepreneur and provide jobs for the society. Entrepreneurship is for better livelihood because it starts with focussing on relevant problem and to bring a solution to that problem.

It is believe that the three qualities that are quintessential is passion, perseverance & persistence and most importantly the person should be a big dreamer. The primary quality of an entrepreneur is that he should be a risk- taker because a common saying is “*Bigger the Risk, Bigger the Rewards*”. It is also important that the students and researcher should be now confident and develop inclinations towards choosing entrepreneurship and contribute their intellectual output for managing the economic turbulence of the society.

Most importantly, as the present Government is emphasizing on Atmanirbharta- it is high time to realize the need for goods and services of the people that we do not have to depend on western produced goods especially in a country like India which has a huge population and therefore, huge potential.

In a boost to startups and entrepreneurs, the Start-up India project has been launched. This flagship programme has 2000 Crore rupees allocated to it. Along with that, the Government also plans to provide budding entrepreneurs with perks such as legal support for filing patents at free of cost and 80% reduction in filing patent fee. Other support for startups and other MSMEs include marketing support, capital subsidies, interest subvention schemes, electricity

rebates.

Another important consideration for new entrepreneurs and startups is to reduce the capital expenditure especially in purchase of land, plant and machinery. Operational expenditure in terms of rent may also pose challenges to startups especially when they are in early stages and the revenue is insufficient to meet expenses. For this purpose, Government has also set up different Industrial Growth Centres, Special Economic zones, Industrial Parks etc. which provide space and even machinery for lease at reduced prices. Institute incubators are another important piece of the entire startup ecosystem. Such incubators are aligned with the Institute’s vision. They provide young researchers, faculty members and also other entrepreneurs working on a specified sector a subsidized space for ideating and translating the idea to a prototype and finally graduate to a product. Institute incubators can help to enable the different research activities taking place to reach the general population through a tangible offering for maximum benefit to society. In effect, they are a bridge between academia and industry.

Fund schemes like AIM, Meity TIDE, ASPIRE, NIDHI PRAYAS and different BIRAC Schemes are strengthening the backbone of Startup-ecosystem.

The government had approved the startup India Seed fund Scheme in January 2021 with a corpus of Rs. 945 crore for next 4 years starting from 2021-22. Funding boom has also seen a rise in demand for good talent & Indian Startups have declared a war against Covid-19 and it is time to change the mindset of the young researchers towards -launching new venture, developing new product, commercializing invention & adopting a technology and enveloping a new market to combat the outflow of national wealth.