Executive Summary

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1. Title of the Project:Next generation filtration devices for protection of environment and health

1. Date of Start of the Project:01 February 2019

2. Aims and Objectives:

   I. To develop large size mechanically stable, biodegradable filter media with high filtration efficiency at reduced pressure drop based on nanofibres as an alternative to existing filter media with an aim to reduce power consumption and promote wider usage.

   II. To develop cost effective filtration devices, such as window screens, industrial airconditioning & air-circulation filters, industrial emission control filters, vehicle cabinfilters, antimicrobial filters for hospitals/homes based on the above nanofibre media toprotect patients from allergens and bacterial infections and help reduce impact of air pollution on health of industrial workers and general population.

3. Significant achievements (not more than 500 words to include List of patents, publications, prototype, deployment etc)

   We were able to meet major milestones in a number ofsubprojects. We have incubated a second startup company, Incipient Materials Pvt Ltd, which will take upthe responsibility of commercialisingsome of our developed technologies and products. Several pioneer industries, including SRF Limited, Birla Century, and Liberty, have shown interest in our products. A MOU was signed with JK Papers, the pioneers in the paper business, to establish the JK Papers Centre of Excellence in Paper and Packaging at IIT Delhi and have received substantial funding for two new projects for developing new products based on paper.

   Patents:- Two national and two international patents were filed/granted in this period. Details are given below:

S.No	**Details of Patent**	**Patent file no**	**Status(filed/accepted)**	**International/National/ Commercial**
1.	Polyester Resin composition and process for producing the same	202111054309	**Filed**	National
2.	"Composite Fibres Having Aligned Inorganic Nano Structures Of High Aspect Ratio And Preparation Method"	GB2557856	**Granted** on April 6, 2022	UK patent
3.	Apparatus and Process for uniform deposition of polymeric nanofibers on substrate	US 11162193 B2	**Granted** on Nov 2, 2021	US patent
1.	MOF Functional Textiles and process of fabrication thereof	202011005551	**Granted**	National/under Commercialization

Publications:- We were able to publish a few articles in reputed international journals. The list is given below:

1. Neeta Kumari, Ashwini K. Agrawal, Manjeet Jassal, Effect of metal ion on UV protective and antimicrobial properties of in-situ synthesized pyrithione complexes on cellulosic textiles, *Materials Today Communications*, 2022 (impact factor 3.662)
2. Gurneet Kaur, Jagan Singh Meena, Manjeet Jassal, Ashwini K. Agrawal, Synergistic effect of Polyurethane in Polyurethane Polyvinylidene fluoride nanofiber based stretchable piezoelectric nanogenerators (S-PENG), *ACS Applied Polymer Materials,* 2022, 4, 4751–4764. (impact factor: 4.089)
3. Sumit Sharma, Fang Wang, P. V. Kameswara Rao, Ashwini K. Agrawal, Manjeet Jassal, ImreSzenti, ÁkosKukovecz, Amit Rawal and Ulf D. Schiller Unfolding the effects of decontamination treatments on the structural and functional integrity of N95 respirators via numerical simulations, *Scientific Reports,* 2022, 12, 4191 (impact factor: 4.380)
4. Saumya Dash, Pinky, Varun Arora, Kunj Sachdeva, Harshita Sharma, Amit Kumar Dinda, Ashwini Kumar Agrawal, Manjeet Jassal and Sujata Mohanty, Promoting in-vivo bone regeneration using facile engineered load-bearing 3D bioactive scaffolds, *Biomedical Materials,* 2022, 17, 034101 (Impact factor 3.715).
5. Nidhi Goyal, Deepali Rastogi, Manjeet Jassal, Ashwini K. Agrawal Kinetic studies of photocatalytic degradation of an Azo dye by titania nanoparticles, *Research Journal of Textile and Apparel,* 2022 Vol. 26 No. 4, pp. 500-514 https://doi.org/10.1108/RJTA-03-2021-0033 (cite score 2.1).

4. Concluding remarks

We were successful in achieving the major milestones as per the timeline. Few of our technologies are being scaled up and under the process of validation by the industry partners.