NONWOVENS R&D STUDENT GRANTS

Students and researchers from a number of centres of excellence have been selected to present their latest work within the broad range of topics pertaining to the scope of the Academy. The students had the opportunity to showcase their projects through posters during the NIA event.

EDANA congratulates the laureates of the poster contest: Frederik Cloppenburg, Zahaib Hassan and Pranil Vora.

The press release is available here: https://www.edana.org/newsroom/news-announcements/2017/10/26/edana-announces-winners-of-2017-nonwovens-innovation-academy-poster-contest

Discover all the posters presented here: https://www.edana.org/docs/default-source/events/nia-17-poster-session.pdf?sfvrsn=0

R&D Student Profiles:

FREDERIK CLOPPENBURG
Institut für Textiltechnik der RWTH Aachen University (Germany)
Head of Research Group Nonwoven Technology
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Frederik Cloppenburg leads the research group for staple fiber based nonwovens at the institute for textile technology of RWTH Aachen University (ITA). He graduated with a master's in industrial economics and engineering at RWTH Aachen University (Germany). He has been at ITA since June 2014.

Frederik Cloppenburg is responsible for the nonwoven technology research group at ITA. He shapes the scientific profile of the research group and represents the group in dealings with other universities and the wider industry. His personal research in publicly funded projects and confidential research projects focusses on the next level automation of nonwoven production processes and the processing of alternative materials.

Frederik will make a presentation on **Bio-composites made from natural fibre nonwovens and bio polymers– the right choice?**

He presents the following **poster:**

Technical and Economic Self-Optimisation for Nonwoven Cards

- Importance and economic impact of self-learning nonwoven cards
- Concept for self-learning nonwoven cards
- Expected results: Reduction of scrap production caused by wrong card settings: 50%

BAHATTIN DÜZENLI
Suleyman Demirel University (Turkey)
B.Sc. Candidate - 4th Grade Student
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Bahattin is a 4th year B.Sc. student in the Textile Engineering Department of Suleyman Demirel University. He has 2 years of experience with the nonwovens field via his university studies and field visits. He participated in the "IX. International R&D Brokerage Event" in the category of ''Vehicle Technical Textiles and Composites'' winning the 2nd place award. He is currently finalising his work on the ''Improvement of Impact & Noise Absorption of Motorcycle Helmets Via Aerogel & Meltblown Layer'' as part of his undergraduate project.

He presents the following **poster**:

Improvement of Impact & Noise Absorption Of Motocycle Helmets Via Aerogel & Meltblown Layer

- Aerogel is shock absorbing and lightweight so it can be used on motorcycle helmets
- Aerogel can return to its original state after a stroke
- The meltblown surface will be produced in a cost-effective manner with conventional non-woven surface production technology and will be added below the shock absorbing surface to improve noise damping capability of the entire helmet
- At the end of this project, an ideal weight, durable, sustainable, composite construction and industry scalable motorcycle helmet will be developed which can absorb shock at a higher level and add high noise absorbency by adding airgel layer and nonwoven surface layer to be used in composite structure of motorcycle helmets

MOHAMED ELSHARKAWY
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Mohamed is a Research Assistant at National Research Centre and is responsible for assisting the Supervisor and Senior Research Associate and also for tool development and the design, collection and analysis of evaluative project data. He is a team member at two research group the first group works to enhance the efficiency of air filter median the second to develop water and blood repellent of the PP medical fabrics. He graduated from Alexandria University Textile Engineering department with distinction.

Mohamed is the youngest junior consulting in the Textile world as he joined Werner International consulting team in 2016 at the Egyptian National project restructuring and developing 25 Cotton, Spinning and Weaving Mills at Holding Company. Mohamed Was one of the team member who founded Mansoura University Nanotechnology Centre which is the first Nano Centre at all Egyptian governmental universities.

He presents the following **poster**:

Enhancing Air Filtration Efficiency Using Needleless Electro-Spun Nanofibers

- Particulate matter (PM2.5) contains microscopic solids or liquid droplets that are so small that they can be inhaled and cause serious health problems.
- There is a great need for the development of filtration technologies to prevent harmful nanoparticles affecting human health. One of the most valid methods of removing particles from a gas stream is via fibrous filters
- Needleless electrospinning appeared with the aim of producing nanofibers on a large scale
- Achieving high efficiency and low pressure drop for the filtration of nano-sized sodium chloride (NaCl) aerosols while depositing a thin layer of nanofibers
- Achieving high filtration efficiency (up to 99.95%) like can be obtained from particulate air (HEPA) filters but with much higher quality factor and less mass

ALI HASSNAIN FARRUKH
Ghent University (Belgium)
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Ali finished his B.Sc in Textile Engineering from National textile University Pakistan in 2006,followed by 8 years' experience in fabric production and development. He is doing M.sc in Advance Textile Engineering from Gent university Belgium. Its European master semesters in Belgium, Turkey and France. He done short research on smart textile "Conformable Antenna development for breast cancer hyperthermia treatment" from NC State University USA.

He wrote projects / reports on topics below during M.Sc.
Textile in Ice Hockey:

- A journey of safety
- Nonwoven technical textile end use applications
- Textile in house building & civil engineering applications
- Multi-functional finish jacket for travellers (In Team)
- Textile composite structure for impact protection (In Team)

BEN GOLLAND
Institute of Medical & Biological Engineering (IMBE), University of Leeds (UK)
PhD Student CDT Tissue Engineering & Regenerative Medicine
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Ben's PhD project focuses on materials and the manufacture of nonwoven structures for promoting regeneration following spinal cord injury - a real clinical need where nonwovens could have a defining impact. This approach is championed by the University of Leeds, which, with collaboration across three research groups – the School of Design, Mechanical Engineering and Oral Biology – is providing an enthusing environment for innovation and one where Ben is helping to find novel applications for future nonwovens.
Ben Golland will make a presentation on "**Single-step electrospinning of aligned polycaprolactone and self-assembling peptide nonwoven fibrewebs for neural tissue engineering**".

He presents the following **poster**:

Use of Single-Step Electrospun Polycaprolactone and Self-Assembling Peptide Aligned Fibres Webs in a Mechanically Tuneable Hydrogel For Spinal Cord Tissue Engineering

- Spinal cord injury affects 1000 people annually in the UK but accounts for £1.5 billion of the NHS budget
- Literature indicates patients and surgeons are now prepared to implant scaffolds into the spinal cord to attempt regeneration
- Highly aligned fibre webs of polycaprolactone and the self-assembling peptide P11-8 were electrospun to form a guide for tissue structuring
- Collagen hydrogel with a storage modulus of ~ 100 Pa was combined with aligned fibre webs to form a scaffold for biological testing

ZUHAIB HASSAN
Istanbul Technical University (Turkey)
PhD Student
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Zuhaib is doing Ph.D in Textile Engineering at Istanbul Technical University, Turkey. He received his Master of Engineering (2014) from Istanbul Technical University, Turkey with distinction. He wishes to become an expert in nonwovens and then deliver his research experience and ideas in the educational field.

VIJAY KUMAR
University of Borås (Sweden)
PhD Student
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Vijay is a final year Ph.D. candidate in the Erasmus Mundus Joint Doctorate Programme, Sustainable Management and Design for Textiles (SMDTex) at University of Borås, Sweden and is currently at Soochow University in China, as part of one year of international research on mobility His research area is in the field of textiles, and a majority of the research has focused on the modelling of nonwoven materials. He has previously published more than 10 papers specifically on nonwovens and nonwoven-like materials in core journals.

Vijay will make a presentation on "**Modelling the elastic response of electrospun nonwoven mats**" during the Modelling & Testing session at the NIA 2017.

- A 2D analytical model of the normalized modulus of electrospun nonwoven mats has been proposed
- The model successfully incorporates the effects of fibre curvature and specimen dimensions
- Good agreement between the theory and experiments was observed

YOLANDA LEASK
Weissensee School of Art (Germany)
MA Student, Textile and Surface Design
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Yolanda completed a four-year Bachelor degree in the department of Textiles and Surface Design at Weissensee in 2017. In the graduation project of this degree, she investigated the possibilities of designing nonwoven textiles with improved drape and natural fibres such as sheep's wool. After conducting trials at STFI, her project resulted in spunlace fabrics made from 100% wool for which she has since filed a patent application. She is currently starting a Masters dissertation in Weissensee.

Yolanda presents the following **poster**:

Sustainable Nonwoven Textiles for Apparel

- Responding to the greater need for sustainability in the textile and fashion industries
- Investigating the potential of using nonwoven processes to produce textiles suitable for apparel
- Attempting to produce nonwoven textiles which exhibit improved drape and flexibility, using natural fibres
- Creatively experimenting with nonwoven techniques to produce innovative designs and interesting aesthetics

MANEESH KUMAR MISHRA
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Maneesh began his PhD in November 2016 at ENSAIT on the topic "Customisation of orthopaedic insoles for atypical plantar morphologies". Having studied "textile technology" and "fibre to fabric" courses during his graduate studies, he has acquired extensive experience with nonwovens.

He has been working on the preliminary study of customized insole for the people with plantar diseases. In order to provide the comfort, safety and durability the top layer amongst many layers is of nonwoven material. Extensive experiments and tests are going on to validate the viability of results.

Maneesh presents the following **poster**:

Customisation of Insole Using Antibacterial Nonwoven

In order to provide comfort to the users of footwear worn in different environment and in everyday life, designers and manufacturers propose specially shaped insoles made of various textile composites. Customization of insoles has also been presented in the market which ensures the satisfaction at some extent. In this research, it has been tried to create sample cell using 3D printer which would be utilized to create the customized insole. Upon successful application the meltblown process is to be adopted to create antifungal nonwoven web as upper layer of insole.

CHRISTIAN MÖBITZ
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Christian is a researcher at the Institute für Textiltechnik at Aachen University, working in the department of nonwovens to gain a deep knowledge of nonwovens and their production technologies. In his dissertation, he focuses on "energy efficient pneumatic fibre transport". He uses, amongst others, the techniques of video analysis and data mining to analyze the transportation process to develop smart controls for fibre transportation in nonwoven production processes which will save at least 30 % of energy used for transport.

Besides his dissertation, he is working in several fields of nonwovens application e.g. the electrical functionalization of composites using nonwovens made from recycled carbon fibres (i.e. heating, failure detection and EMI shielding).

Christian will make a presentation on "**Potatoes go nonwoven - cheap fibres made from biopolymers**" and also presents the following **poster**:

Energy Efficient Fibre Transport

- Target: Reduced energy consumption of 30%
- Approach: Analysis of fibre transport using high-speed-video and image processing
- Results so far: Test-bench for examination of continuous fibre transport with image processing unit

KAMESWARA RAO
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Kameswara is a Ph.D. scholar at the Indian Institute of Technology Delhi, India. His research area is in the field of nonwoven battery separators, with a major focus on the modelling of geometric, hydraulic and mechanical characteristics of nonwoven materials. He has published 3 papers in core scientific journals on nonwovens to date. He also has two international patents published pertaining to enhancing performance of battery separator products by combining them with nonwovens and technical textiles.

Kameswara presents the following **poster**:

Influence of Fibre Orientation on Pore Size Characteristics of Nonwoven Materials

- Fibre orientation is a key parameter affecting the geometrical, hydraulic and mechanical properties of nonwoven materials
- The effect of fibre orientation on the pore size has been experimentally investigated based on air-laid, parallel-laid, and cross-laid structures following through-air bonding
- The influence on pore size was further elucidated by evaluating experimental and theoretical models based on sieving-percolation pore network theory including a model that incorporates directional parameter to account for the effect of fibre orientation

JESSICA RICKMAN
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Jessica has an undergraduate grounding of biology and pharmacology at the University of Bath where she discovered the field of technical textiles during her year studying textiles and fashion in London.

Her research in the field of collagen wet-spinning for the purpose of wound dressings has aided her in synthesising, spinning and characterising a new collagen based biomaterial, and devising a new spinning set up for the small-scale production of fibres. She hopes to develop this work into the formation of nonwoven textiles and fibre yarns.

Jessica will make a presentation on "**Functionalised collagen based nonwovens via wet spinning and drylaid web formation for medical devices**" during the Modelling & Testing session at the NIA 2017.

- Current collagen spinning processes denature the complex triple helix, leading to impairment of the material's mechanical and thermal stability
- Incorporating a newly developed wet spinning technology and a pre-functionalisation technique, a one-step spin and UV crosslinking process is devised which will preserve the structure of the collagen protein
- This new technique, combined with nonwoven processes, can be utilised in the production of medical devices

SUMIT SHARMA
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Sumit holds a Master of Technology (M. Tech) from the Indian Institute of Technology Delhi and is now pursuing a doctorate at the same Institute. His dissertation was on "Superhydrophobic behaviour of 'Dual Scale' nonwoven mats", wherein he prepared dual scale structures in Nonwoven Mats which induced superhydrophobic behaviour in the mats. Later, he modelled the structure-property relationship of these dual scale structures.

He has also published a paper entitled "Designing superhydrophobic disordered arrays of fibres with hierarchical roughness and low surface energy".

Sumit presents the following **poster**:

Designing Superhydrophobic Nonwoven Materials with Hierarchical Roughness and Low Surface Energy

- Design parameters for hierarchically structured superhydrophobic nonwoven materials have been quantified
- Contact angles are predicted for different wetting states of three dimensional nonwoven materials
- Comparison has been made between theoretical and experimental results

MUHAMMAD UMAR
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Muhammad graduated in 2013 from the National Textile University in Faisalabad, Pakistan where he completed a four-year bachelor's degree (B.Sc Textile Engineering) with specialization in garments. He has extensive research experience on modelling the properties of polypropylene nonwovens and multifunctional fibres for nonwoven dressings during his master studies.

He has four publications in international journals and four papers published in proceedings of international conferences.

He presents the following **poster**:

Modelling the Properties of Pigment-Printed Polypropylene Nonwoven Fabric

- Development of statistical models to check the effect of binder concentration and curing temperature and time on the air permeability, tear strength, tensile strength and crocking fastness of polypropylene nonwoven fabric
- Design and analysis of the experimental work were carried out using MINITAB statistical software according to the Box–Behnken design of response surface methodology

PRANIL VORA
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Pranil is currently completing his final year of bachelor's degree program in Textile Technology at D.K.T.E'S Textile & Engineering Institute, India. He wants to focus his career in the field of nonwovens and has done specialized training in Ahlstrom Fibercomposites (India) and Supreme Nonwovens India Pvt Ltd. He had attended International summer course in Hof University where he was well exposed to the ongoing work in the field of nonwovens along with several expertized lectures and excursions to the industries. He has been working on the engine filter project since a year at the Centre of Excellence for nonwovens in D.K.T.E.

He presents the following **poster**:

Development of Nonwoven Air Filter For Petrol and Diesel Engines

- Development of an alternative to current filter used in automotive industry
- Application of Poly Vinyl Chloride and its outcome
- By incorporating negative ion producing elements into the replaceable filtering member of the air filter inside the internal combustion engine
- The proposed filter will help to increase the concentration of the negative ions in the atmosphere and markedly reduce the emission of NOx and SOx
- Reduction in emission of pollutants and increase in the fuel efficiency i.e. mileage