

O14.**Nano-engineering highly toughened fibre reinforced polymer composites by interleaving electrospun nanofibres for advanced applications**

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Fiber reinforced polymer composites are the material of choice for designing applications which require a high strength and stiffness at minimal weight such as aerospace structures, wind turbines or ultralight vehicles. However, delamination between the reinforcing plies remains a major problem as it limits further breakthrough of these materials. Recently, interleaving electrospun nanofibres between the reinforcing plies has proven to be a viable interlaminar toughening method which can significantly limit the occurrence of delamination failure in composite materials [1,2]. This presentation will give a thorough insight into the relationship between the electrospun nanofibre properties and the resulting tough composites, and as such, allow for engineering novel and damage resistant nanofiber toughened composites.

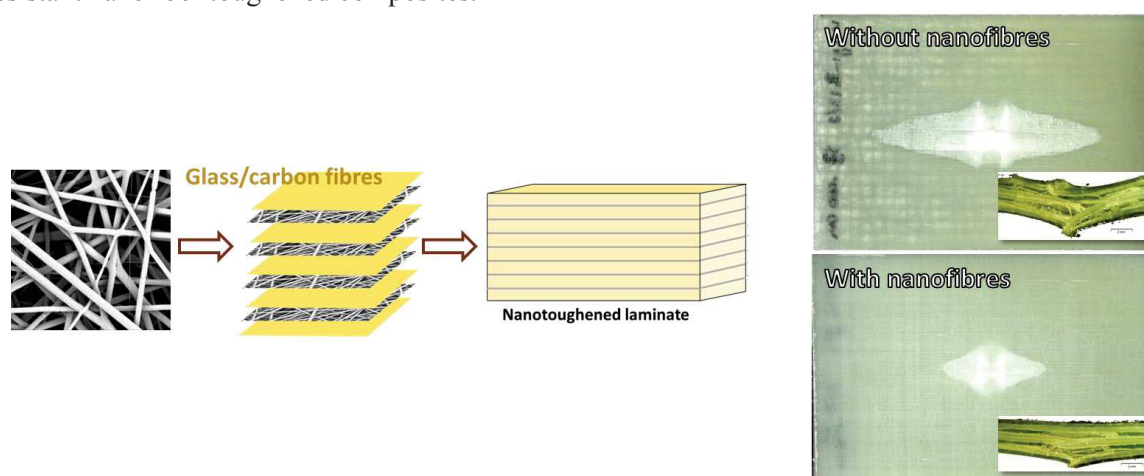
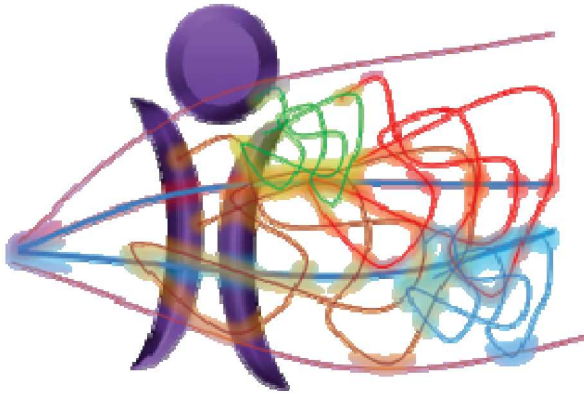


Figure 1: Nanotoughened composites with interleaved nanofibres show better impact resistance.

References

- [1] L. Daelemans et al., *ACS Appl. Mater. Interfaces* 8 (18), 11806-11818 (2016).
- [2] L. Daelemans et al., *Compos. Sci. Technol.* 117, 244-256 (2015)



Book of Abstracts

ElectrospinCY_2017

19th – 21st April 2017 | University of Cyprus, Nicosia, CYPRUS

Conference Programme

Conference/MP1206 final MC meeting Venue: University of Cyprus, New University Campus,
(1 Panepistimiou Avenue 2109 Aglantzia, Nicosia. P.O. Box 20537, 1678 Nicosia, Cyprus)

Wednesday 19 th April				
08.00-	Registration			
Session A (Building: XQΔ02, Room B205) Chair: T. Krasia-Chistoforou				
9.00-9.10	Welcome and Opening Remarks			
9.10-9.50	PLENARY		G. L. Bowlin Electrospun Templates: Designing Tools for Directing Endogenous Tissue Regeneration	
9.50-10.30	PLENARY		E. Zussman Mechanical Stress Induced Drug Delivery from Nanofibers	
10.30-11.00	Coffee Break			
Session B1 Energy, sensors and actuators (XQΔ02, B205) Chair: S. Cavaliere			Session C1 Biomedical applications (XQΔ02, B204) Chair: E. Kijeńska	
11.00-11.25	INV1	Y. Truong Electrospun nanofibre membranes for energy and biomaterial applications	INV7	A. Jedlovszky-Hajdú Creating silver loaded artificial matrix for biomedical applications
11.25-11.50	INV2	A. Macagnano CdSe/ZnS-TiO ₂ nanofibers: A suitable combination for a low cost and effective sensor device	INV8	B. Mijovic Electrospun composite scaffolds for ocular tissue regeneration
11.50-12.15	INV3	D. Pisignano Enhanced photon coupling and transport properties in electrospun nanowires	INV9	A. Odysseos Tissue-Engineered Biomimetic Platforms for Signaling Analysis in the Tumor Microenvironment
12.15-12.40	INV4	A. Camposeo Controlling energy migration and emission properties in semiconducting electrospun polymer fibers	INV10	M. Järvekülg 3D scaffolds from electrospun gelatin
12.40-12.55	O1	L. Lozzi Near-field electrospinning: an easy method to grow nano-structured systems	O5	A. Rinaldi Statistical methods for the design of scaffolds for tissue engineering and cell culturing
13:00-14:30	Lunch			
Session B2 Energy, sensors and actuators (XQΔ02, B205) Chair: D. Pisignano			Session C2 Biomedical applications (XQΔ02, B204) Chair: A. Jedlovszky-Hajdú	
14.30-14.55	INV5	S. Cavaliere Nanocomposite membranes based on electrospun nanofibers	INV11	R. Machado Electrospun silk-elastin fibres functionalized with silver nanoparticles as antibacterial wound dressings

14.55-15.20	INV6	L. Persano Piezoelectricity in electrospun polymer nanofibers: Fundamental phenomena and applications	INV12	E. Kijeńska NGF loaded bio-composite scaffolds for peripheral nerve tissue regeneration
15.20-15.35	O2	K. Polak-Krasna Electrospinning of polymer of intrinsic microporosity for hydrogen storage applications	O6	A. Da Costa Antibacterial protein-based fibres: combining recombinant DNA technology with electrospinning
15.35-15.50	O3	T. Tätte Self-formed metal oxide ceramic microtubes and their applications	O7	C. Voniatis Prospects of poly(vinyl)alcohol scaffolds in abdominal hernia treatment. A study of bio-adaptability in small animals
15.50-16.05	O4	W. Woon-Fong Leung Light harvesting in dye sensitized solar cell based on co-sensitizer in core-shell nanofiber configuration reducing charge recombination	O8	M. Kruse Electro-spun sPEEK Membranes for Oxygenation Applications
16.05-16.20			O9	P. Sajkiewicz The effect of a solvent on structure, biodegradability and cellular response of electrospun PCL/gelatin and PCL/collagen nanofibers
16.20-16.35			O10	I. Wimpenny Co-electrospun biomimetic grafts for regeneration of axons in CNS
16.35-16.50			O11	L. Zajíčková Electrospun PCL/PEG nanofibers with varied biodegradability coated by bioactive amine plasma polymers
17:00-20:00	Poster and photo competition sessions/cocktail buffet			
	Social Activities Building, Room 010			

Thursday 20 th April / MP1206 COST Session			
Session D (Building: XΩΔ02, Room B205) Chair: T. Krasia-Chistoforou			
9.00-9.40	PLENARY		W. Sigmund Functional Nanomaterials via Electrospinning
9.40-10.05	INV13		S. Agarwal Fibers with special morphologies by electrospinning
10.05-10.30	Coffee Break		
Session E1 Processing, morphology control and applications (XΩΔ02, B205) Chair: A. Macagnano		Session E2 Processing, morphology control and applications (XΩΔ02, B204) Chair: S. Agarwal	
10.30-10.55	INV14	K. De Clerck Advanced colorimetric sensors based on dye-functionalized nanofibers	INV18 J.M. Lagaron Development and characterization of novel electrospun biopolyester coatings for barrier paper applications
10.55-11.20	INV15	C. Adlhart Amphiphilic ultralight 3D aerogels from electrospun nanofibers	INV19 B. Pilić Nanofiber based intelligent packaging
11.20-11.45	INV16	P.D. Topham Block copolymer self-assembly: Rinse-resistant superhydrophobic fabrics made using a combination of electrospinning and electrospaying	INV20 T. Uyar Decoration of metal nanoparticles (Pt-NP and Pd-NP) on electrospun nanofibers via atomic layer deposition for catalytic applications
11.45-12.10	INV17	M.L.Focarete Atmospheric pressure non-equilibrium plasma applied to electrospinning processes and products	INV21 K. Pielichowski Surface modification of polylactide by electrospinning of chitosan/nanosilica outer layers to improve flame retardant properties
12.10-12.25	O12	I. Savva Magnetoactive Electrospun fibers: Fabrication, characterization and applications	O14 L. Daelemans Nano-engineering highly toughened fibre reinforced polymer composites by interleaving electrospun nanofibres for advanced applications
12.25-12.40	O13	N. Radacsi Temperature effects on the fiber diameter during the fabrication of PVP and PVA nanofibers by needleless electrospinning	O15 P.Heikkilä Electrospun sheet materials from CA, PES and PLLA as supports for ALD coating
13:00-14:30	Lunch		

Session F1 Environmental and agricultural applications (XΩΔ02, B205) Chair: N. Radacsi			Session C3 Biomedical applications (XΩΔ02, B204) Chair: J.M. Lagaron	
14.30-14.55	INV22	H.E. Hummel Electrospun mesofibers in precision viticulture: A new alternative for dispensing sex pheromones in mating disruption schemes for IPM	INV26	A. Greiner Release of artemisone from electrospun nonwovens for the treatment of malaria
14.55-15.20	INV23	F. De Cesare Development of smart nanofibrous plant growth promoting rhizobacteria (PGPR) biofilms for agricultural applications	INV27	S.K. Bhullar Deformation mechanism of smart nanofibrous stents and drug delivery systems
15.20-15.45	INV24	Y. Truong Large scale preparation and characterization of electrospun carbon particle-nanofibre composites for ammonia adsorption	INV28	U. Stachewicz 3D analysis of cell responses to electrospun polymer nanofibers scaffolds
15.45-16.10	INV25	M. Roso Different strategies for enhancing the performance of TiO ₂ based nanostructured membranes for VOCs abatement	INV29	E. Kijeńska PLLA and PCL-based electrospun scaffolds for tissue engineering applications: fabrication and biological characterization
16.10-16.25	O16	Y. Truong Preparation and characterisation of electrospun gelatin-saponin composite nanofibers	O22	Ž. Rukuižienė Electrospun web with baltic amber particles
16.25-16.40	O17	M. Maryšková Enzyme-loaded nanofibrous mats by electrospinning for biomedical and environmental applications	O23	A.S. Sarac Conductive polyanthranilic acid nanofibers
16.40-17.00	Coffee Break			
Session F2 Environmental and agricultural applications (XΩΔ02, B205) Chair: K. De Clerck			Session C4 Biomedical applications (XΩΔ02, B204) Chair: A. Greiner	
17.00-17.15	O18	P. Papaphilippou Electrospun polymer-based fibrous membranes as adsorbents for bacteria and organic compounds removal from water contaminated media	O24	S. Metwally Production of charge induced nanofibres scaffolds
17.15-17.30	O19	D.G. Ruzgar Electrospinning of wool keratin/poly(ethylene	O25	P. Mikes Complete analysis and comparison of poly(lactic acid-co-

		oxide) blend nanofibers for air filtration application		caprolactone) nanofibers for tissue engineering applications
17.30-17.45	O20	G. Schlatter Hierarchical metal@carbon composite hairy nanofibers for catalytic applications	O26	K. Molnár Poly(amino acid) based nano gel fibers for tissue engineering
17.45-18.00	O21	W. Woon-Fong Leung Loading and Cleaning of Nanofiber Air Filter After Long-Term Use		
18.30:	Transportation to the conference dinner venue			
19.30 -:	Conference dinner			

Friday 21st April / MP1206 COST Session (XΩΔ02, B205)				
9.30-11.30	COST MP1206 Management Committee Meeting			
Session C5 Biomedical applications Chair: T. Krasia-Christoforou				
11.30-11.45	O27	J. E. ten Elshof Sol-gel derived ceramic nanofibers and their applications in biomedical engineering and electronics		
11.45-12.00	O28	L. Liverani Multilayered scaffolds and graded mineralization for osteochondral tissue engineering applications		
12.00-12.15	O29	M. Omastová Conducting polycaprolactone/polypyrrole nanofiber mats prepared by electrospinning		
12.15-12.30	O30	I. Safarik Magnetically-modified electrospun chitosan-based fibers: Fabrication, characterization and bioapplications		
12.30-12.45	O31	Š. Zupančič Antimicrobial nanofibers for treatment of local infections		
12.45-13.00	Closing remarks			
13.00-15.00	Lunch			

Saturday 22nd April				
Post-Conference Social Programme: Post-conference Guided Tour Mountain villages on Troodos Mountains: Kakopetria, Troodos, Omodos (Optional)				

POSTER SESSION

Wednesday 19th April 2017, 17:00
Social Activities Building, Room 010

POSTER NUMBER	PRESENTER'S NAME	POSTER TITLE
PO.1	E. Schoolaert	Waterborne electrospinning of poly(N-Isopropyl Acrylamide) towards stable nanofibers
PO.2	J. Dusza	Development of Al ₂ O ₃ electrospun fibers
PO.3	T. Meireman	Interlaminar toughening of resin transfer moulded laminates by electrospun polycaprolactone: Effect of interleave morphology
PO.4	S. Yildirim	Electrospun nanofibers as food contact layer for palladium based oxygen scavenging films
PO.5	M. Mader	Ultralight, biodegradable and highly porous soft polymer sponges based on electrospun fibers
PO.6	A. Portone	Nanocomposite electrospun fibers embedding 2D-Materials
PO.7	N. Radacsi	3D-electrospinning: A novel method to control the structure of nanofibers and its application for nanostructured fuel cells
PO.8	S. Reich	Highly conductive and flexible nonwovens for application as electrodes
PO.9	V. Vassiljeva	Electrospinning of SAN conductive reinforced membranes
PO.10	K. Castkova	Ceramic fibres for energy applications
PO.11	V. Tsigkis	Naturally-derived electrospun fibers with potential applications in batteries
PO.12	W. Gieparda	Flammability and structure of PLA/PHB nanofibers modified with different types of carbon nanotubes.
PO.13	I. Ristić	Electrospun conductive nano-fibres based on poly(lactide)
PO.14	C. Sofroniou	NSAD drug release from electrospun polymer nanofibers
PO.15	C. Voniatis	Prospects of poly(vinyl)alcohol scaffolds In abdominal hernia treatment. A study of mechanical properties.
PO.16	M. Kokonou	Electrospun PEO/PLLA Fibrous Membranes for Sustained Tyrosine Kinase Inhibitors Delivery in Situ
PO.17	K. Christodoulou	Anthracene-containing electrospun fibers for ammonia gas sensing

PO.18	G. Papapaskeva	Synthetic strategies towards the combination of hydrogels with electrospun fibers
PO.19	A. Christofi, C. Christou	Lime-based composites reinforced with electrospun fibers
PO.20	M. Nikolaou	Effect of UV irradiation and sonication on the morphology of electrospun polymer-based nanocomposite fibers
PO.21	A. Rinaldi	Cross-cutting opportunities in Europe for technologies for extreme applications and low or null critical raw material content
PO.22	I. Savva	Chitosan-based electrospun nanocomposite fibrous mats and their bioapplications