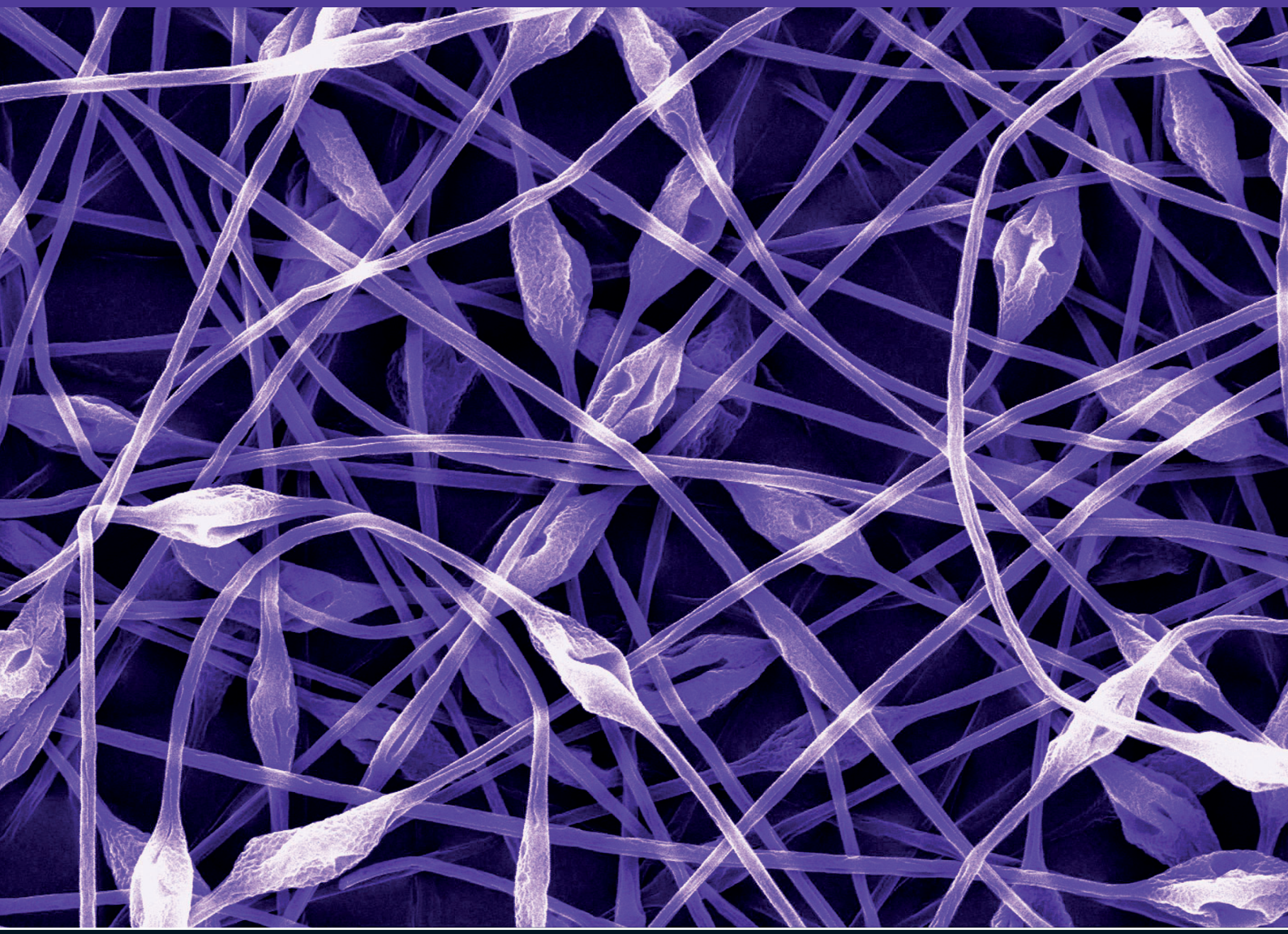
Abstract Book



Electrospinning, Principles, Possibilities and Practice 2013

5 – 6 December 2013
Institute of Physics, London, UK

Organised by the IOP Dielectrics Group and Polymer Physics Group

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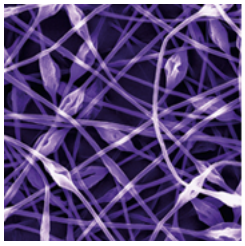


Electrospinning, Principles, Possibilities and Practice 2013

Programme

5-6 December 2013
Institute of Physics, London, UK

Thursday 5 December 2013

09:45 Registration and welcome refreshments
Hooke Room, 2nd Floor, Institute of Physics

10:15 **Welcome address**
Chairman: Professor Geoffrey Mitchell
Hooke Room, 2nd Floor, Institute of Physics

The Electrospinning Process

10:30 **(plenary) Opening lecture**
S Ramakrishna, National University of Singapore, Singapore

11:15 **Development of pulse electrospinning setup and getting micron length of fiber**
Y Aliyev, Institute of Combustion Problems, Kazakhstan

11:40 **Effect of chain entanglements on electrospun poly lactic acid (PLA) fibres**
R Casasola, Loughborough University, UK

12:05 **Recent advances in colloid-electrospinning**
D Crespy, Max Planck Institute for Polymer Research, Germany

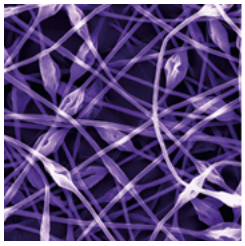
12:30 Lunch
Abdus Salam Room, 2nd Floor, Institute of Physics

13:30 **(invited) Polymer network in a strong extensional flow - A study of the electrospinning jet**
E Zussman, Technion - Israel Institute of Technology, Israel
Hooke Room, 2nd Floor, Institute of Physics

13:55 **Presentation tbc**

14:20 **High-throughput slit-surface electrospinning of core-sheath fibers**
Q Pham, Arsenal Medical, USA

14:45 **Molecular insight into the NanoSpider technology from computer simulations**
F Moucka, J E Purkinje University, Czech Republic



Electrospinning, Principles, Possibilities and Practice 2013

Oral Abstracts

Thursday 5 December 2013

The Electrospinning Process

(invited) IOP London Electrospinning conference 2013 – Opening address

S Ramakrishna

National University of Singapore, Singapore

Electrospinning produces continuous fibers with thickness in the range of 1000 nm to 50 nm, and electrospraying produces particles with diameters in the range of 500 nm to 50 nm. These techniques are integrated to produce unique composite materials. Electrospun materials offer favourable properties including enhanced mechanical properties, surface-to-volume ratio, variations in wetting behaviour, tailored biological response, permeability, charge transport characteristics. Electrospun materials organised in two and three dimensioins are particularly interesting for enhancing the performance of various applications in healthcare (regenerative medicine, reprogramming of cells, drug delivery, stem cells and implants), wellbeing (nutrition, food & health supplements), recreation (light weight structures, fouling & bacteria resistant coatings & surfaces), energy (harvesting, storage, & efficiency), environment (air pollution control and water treatment). Hence the last ten years saw worldwide growth of R&D on various uses of electropsun materials. Where do we go from here? What do we need to overcome to make further progress?

Development of pulse electrospinning setup and getting micron length of fiber

Y T Aliyev, B M Dabynov, Z G Ospanova and Z A Mansurov

Institute of Combustion Problems, Republic of Kazakhstan

With conventional electrospinning method to obtain short fibers is problematic, the use of which is important in those problems where it is required a homogeneous mixing of fibers with other chemicals.

The aim of this work is the development and construction of the pulse electrospinning setup to produce nano-sized particles, with the ability to control their size. The prefix "nano" means that the dimensions of the particles to range from 10 to 500 nm in at least one dimension.

The prototype of the pulse electrospinning setup is a classic electrospinning setup, which operates at a constant voltage. In the pulse electrospinning setup unlike classical setup high voltage is applied in the form of controlled pulses, which allows to obtain a controlled fiber length.

An attempt was done in Canada to develop a setup of pulse electrospinning (2010y). However, in this setup, there was a technical limitation on the pulse value that arises due to the necessity of selecting high-voltage transistors with the same parameters (the authors used an insulated gate bipolar transistor). The maximum amplitude reached by the authors of the work does not exceed 10 kV, which is not possible to obtain short fibers.

We have designed and developed a pulse electrospinning setup, which has a higher amplitude of the high voltage - 16 kV (which is 6 kV more than the above settings). In the present apparatus for producing a pulsed high-voltage high-frequency transformer is used. A schematic diagram and photo of pulse electrospinning setup is showed.