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POLYMER FIBERS

Editorial: The Fiber Society 2012 Fall Meeting and Technical Conference in partnership with Polymer Fibers 2012

Boston Convention and Exhibition Center, Boston, Massachusetts, November 7–9, 2012

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It was with great pleasure that I co-chaired the Fiber Society's 2012 Fall Meeting and Technical Conference in Boston in November 2012. The other co-chairs of the meeting were Professor Greg Rutledge (MIT) and Dr. Cheryl Gomes (QinetiQ). The meeting was held in association with Polymer Fibers, a series of conferences that started life in Manchester in 2000 and have run every 2 years since then. A previous edition of *Journal of Materials Science* featured papers from this conference in 2001 [1] with an editorial from Professor Robert J Young FRS, another editor of this journal.

We had a full program in Boston, taking over a small number of rooms at the back of the conference venue, the Boston Convention and Exhibition Center, that had the night before held the rally for the Republican election campaign for Mitt Romney. As they cleared away banners and swept up we set up and held our meeting. We had a wide range of talks, from using textile fibers for artificial muscles to the use of electrospun fibers for tissue engineering. The true diversity and longevity of polymer fibers as a rich area of research was brought out at the meeting and sessions were held on a number of topics including

- Carbon fibers and composites
- Thermal and spectroscopic properties
- Clean water/clean energy
- Mechanical properties
- Natural fibers
- Surface properties
- Biology and health
- Fiber processing
- Nanofibers
- Sensors and electrical properties

There was strong international representation from Asia, Europe, and North America at the meeting. A small snapshot of 10 papers is contained in this issue reflecting this diversity.

The first of these papers by Aykut et al. [2] reports on a simple method to make activated porous carbon fibers from polyacrylonitrile. These fibers could find use in supercapacitors. The fibers are cheaper and easier to produce and thus could have enormous benefits industrially.

The following paper by Avci et al. [3] reports on a modified process to make high strength (tenacity) fibers from polypropylene. These fibers are used widely in a variety of applications, including geotextiles which is an emerging area of research worldwide.

Brenner et al. [4] report on the electrospinning of hyaluronic acid, a material found widely in the connective, epithelial, and neural tissues. The electrospinning process is shown to be assisted by the presence of phosphate salts and could have implications for the design of new tissue engineering materials.

Cai and Gevelber [5] report on the effect of evaporation rate and relative humidity on the electrospinning of polyethylene oxide. To separate these two influences they also study the electrospinning of poly(vinylpyrrolidone) alcohol. Process control of this emerging technique for nanofiber production is very important and so this adds new insights to this field.

Choong et al. [6] report on the compressibility of electrospun fiber mats. This is the first time that these particular physical properties of electrospun fiber networks have been reported. Electrospun fiber mats could have potential use as

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interleaves in composites where their compressive properties will play an important role.

Hsieh [7] builds upon her work on cellulose nanocrystals (sometimes called cellulose nanowhiskers) and shows how those produced from agricultural and processing by-products exhibit different morphologies and self-assembling properties. Most interestingly, cellulose nanocrystals derived from rice straw self-assemble into long fibers, which has implications for our understanding of how highly crystalline fibrils and fibers may be generated from a variety of biomass.

Pullawan et al. [8] show that water has a dramatic effect on the interface between cellulose nanowhiskers and a cellulose matrix material. The nanowhiskers are shown to orient toward the stress direction when the composite samples are drawn in tension and the process is assisted by the presence of water. This work shows the possibility of using water processing for these new and emerging materials.

Schiffman et al. [9] show how glutaraldehyde can be used to crosslink electrospun fiber mats of poly(allylamine), an amine containing polyelectrolyte. This development opens up the possibility to use this material for tissue engineering.

Xu et al. [10] report on dry spinning of polyimide fibers. This is achieved by initially spinning polyamic acid and then heat-treating to form polyimide. These fibers are often used in the electronics industry for flexible cables as they are heat resistant, so new processing routes and better understanding of their properties is required.

Zhao et al. [11] report on the production of a 3D woven fabric that could be used for wastewater treatment and bioremediation. The fabric shows improved performance over existing technology and so offers promise for this application.

I do hope you enjoy reading the papers in this special section of *Journal of Materials Science*. The Fiber Society conferences are held twice a year, usually in May and October; more information is available at http://www.thefibersociety.org. The next Polymer Fibres conference will be held in Holland in July 2014. I hope that you can join us there.

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