Editorial corner – a personal view

Electrospinning a feasible nanotechnology

Gy. Marosi*

Organic Chemistry and Technology Department of Budapest University of Technology and Economics,
H-1111 Budapest, Műegyetem rkp. 3, Hungary

Electrospinning is the best example how a mature technology can rejuvenate when its right time arrives. The electrospinning method was born in 1902, when the simultaneous stretching and drying of polymer solution under the drawing force of electrostatic field was invented. Even the solvent-free melt alternative of the process was invented already in 1936. However, as the electrospinning method could not compete with the mass production technologies of fabrics, it was almost forgotten. The single exception was the military application of electrospun size exclusion membranes for removal of bacteria from infected water. The rejuvenation started in the nineties parallel with the increasing importance of nanotechnology. Comparing to the creation of other nanoobjects the productivity of continuous nanofiber formation by electrospinning is quite high. Therefore a wide range of potential applications for electrospun nanofiber and related assemblies has been identified, and increased exponentially. Nanofibers mimic the extracellular matrices (fibrous proteins) of living organisms. This similarity initiated the development of medical tools for tissue engineering and wound dressing made of polymer nanofibers including or covered with bioactive molecules, such as collagen, that support cell adhesion and proliferation. Drug delivery can utilize gelatine and other biodegradable nanofibers of hollow or core-shell structure. Enzymes immobilized on electrospun scaffolds catalyze the relevant biochemical

processes. Rapid prototyping uses composite (such as hydroxyapatite containing) nanofibers for forming implant materials. Electrospun polyamide and polyacrylonitrile with carbon-nanotube content are used as conductive electronic units and similar composite nanofiber sensors of high absorbed-gas sensitivity are used for electronic nose application. Nanofibers of LiFePO_4/C content act as cathode material for Li-ion batteries. Electrospinning of emulsions, owing to drop breakup, results in fine distribution of the dispersed phases. Nanofibers in traditional composites may contribute to reinforcement and render them multifunctional (flame, chemical, environmental protection). These possibilities initiate development of new devices for mass-production of nanofibers.

Prof. Dr. György Marosi
Member of International Advisory Board

*Corresponding author, e-mail: gmarosi@mail.bme.hu
© BME-PT