Editorial corner – a personal view

Polymer technology and bioengineering – which learns from the other?

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From the technological point of view pharmaceutical and biomedical engineering remained underdeveloped for a long time compared to the polymer industry, in spite of their high scientific respect and good financial background. Economic and versatile continuous polymer technologies (such as extrusion injection molding, fiber and film formation) started to revolutionize the pharmaceutical industry just recently replacing mature batch methods. While pharmaceutical extrusion has already been introduced into the industrial practice by some leading pharma-market players other methods, such as two component injection molding; electro-spinning; melt blowing; 3D printing and supercritical-extrusion, are only at the exploratory stage. Polymer research gained new impetus in the health related application fields focusing on molecular mobility; polymorphism; T_g manipulation; chemical-physical stability; shape memory; and interactions with biomolecules or living organs. While trying to influence these factors effectively well-established polymer technologies became under spotlight of interest and their new potential (e.g. capability for controlling the structure accurately) are recognized. On the other hand, instead of the robust mass production of the plastic industry much subtler treatment is required for processing the very sensitive substances used in the biopharmaceutical industry. Efforts to meet these requirements induce technological innovations such as new alternating current (AC) electro-

spinning for the formation of drug loaded nanofibers and bio-printing for constructing organs from stem cells. Polymers, optimized for the purposes of pharmaceutical and tissue engineering, have to be developed and their manufacturing needs to be combined with real time monitoring (e.g. Raman or other spectroscopic techniques) and strict closed loop control of the product quality. Authorities promote this approach, called Process Analytical Technology (PAT), through their recent directives. There is a chance now for utilizing the recent advancement in the combination of biotechnology and polymer processing, achieved by the health related polymer researches, for unique engineering purposes (e.g. controlled release of protecting substances, microbiological protection against fouling, 3D printing of enzyme-activated energy harnessing systems, etc.). It is the right time now for refreshing the polymer engineering-related knowledge by considering the achievements of pharma- and bioengineering.

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