Editorial corner – a personal view

Accelerating the convergence of synthetic and bio-polymer systems

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The dreams of sci-fi novelists, as sensing synthetic implants that cooperate with a living organism, humanoid robots or nanobots, became by now the part of real life (<https://doi.org/10.1002/aisy.201900190>). Multifunctional composite objects can perform both reinforcing and sensing function (<https://doi.org/10.1016/j.compositesa.2020.105804>) similarly to biocomposites originating from the evolution of nature (woods; bones; etc.). The level of communication of these sensing polymer composites with the nervous system (<https://doi.org/10.1186/s12929-018-0491-8>) or multilevel control systems of the industry (bioinspired industry 4.0) needs to be developed rapidly, which promotes the convergence between bio-origin and human-made environments. The next driving force of this convergence originates from the increasing environmental awareness. Both stabilization and controlled sensibilization of polymers (reducing their environmental impact) can be performed with biopolymers, e.g., with DNA of flame-retardant activity (<https://doi.org/10.3389/fchem.2019.00685>) or enzymes embedded in biodegradable polymers (<https://doi.org/10.1016/j.colsurfb.2019.110678>). Health awareness is perhaps the strongest driving force for science and technology. Accelerating convergence between the polymer and pharmaceutical technologies can be seen for several years (<https://doi.org/10.3144/expresspolymlett.2012.37>). Still, most recently, an exciting renewal of the research of beta relaxation in special drug carrier polymer systems called amorphous solid dispersion (ASD), has come into focus (<https://doi.org/10.1021/acs.jpcc.7b10105>).

The analogy with similar studies on the segmental mobility of polymers is obvious (<https://doi.org/10.1007/s10973-017-6098-6>). The macromolecular mobility influences, especially the formation of ASD-type pharmaceuticals that are processed by alternating current electrospinning (ACES) (<https://doi.org/10.1016/j.ijpharm.2019.03.005>).

Electrospinning offers a unique opportunity for creating the most challenging combinations of synthetic polymers and proteins: the solid blends of monoclonal antibodies (MAB) and synthetic biopolymers. Liquid pharmaceuticals containing sensitive drug bio-macromolecules (e.g. antiviral and cancer drugs) can be transformed in this gentle way to solid stabilized formulations (<https://www.doi.org/10.3144/expresspolymlett.2019.50>). Vaccines, containing a polynucleotide chain, should be formulated with a water-soluble polymer to get rapidly soluble reconstitution injections that can allow the widespread application of the highly expected COVID-19 vaccine under extreme climatic conditions.

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