

Introduction

Dear Readers,

The Institute of Macromolecular Chemistry of the Czech Academy of Sciences (IMC) is an academic world-wide recognized institution focused on macromolecular science. The research at IMC is aimed at the synthesis of polymers and new polymer materials, polymer physics and physical chemistry of polymers. The uniqueness of the IMC is based on broad experience and extensive knowledge of its scientists working in a wide range of branches of polymer science under one roof. Since its founding by Professor Otto Wichterle, the inventor of soft hydrogel contact lenses, the ongoing research has been targeted on a development of new polymer materials for advanced technologies as well as for biomedical application.

To keep pace with technological development, bioengineering and biomedical research, the IMC has founded the Otto Wichterle Innovation Centre of Polymeric Materials. It has been established in two stages through the assistance from the Operational Programme Prague – Competitiveness. Moreover, the IMC is a member of a newly established research center BIOCEV (Biotechnology and Biomedicine Center of the Academy of Sciences and Charles University in Vestec), which brings together researchers from different fields to form a multi-disciplinary team solving highly innovative projects within the biomedical field.

Present medical research becomes highly interdisciplinary across various fields of biology, chemistry and physics. This increasing trend of

interdisciplinarity is applied not only in the determination of molecular cause of the disease process and monitoring of molecular pathology but also in the precise diagnostics and specific treatment of diseases of various origins. The interdisciplinary research formed in recent years has led to emerging field of nanotechnology which can distinctly improve the therapy process. The macromolecular chemistry plays a significant role in designing the nano-materials designed for biological application. Contemporary biomaterial and biomedical research is aimed at creating complex polymeric systems that actively interact with biological environment (i.e. tissues and cells) in the desired manner, or controllably release biologically active substances (e.g. therapeutic substances or genes) in target tissues. These novel systems open new possibilities in the therapy of various diseases (especially tumorous, inflammatory or degenerative disorders), in regeneration medicine, tissue replacement, and also in novel medical diagnostics.

This special issue of Physiological Research clearly demonstrates the considerable impact of macromolecular science on nanotechnology and clearly represents the current trends in research of biomedical polymers, particularly polymer biomaterials for tissue engineering and bio-macromolecular systems for drug delivery and diagnostics within the Institute of Macromolecular Chemistry of the Czech Academy of Sciences.

Tomáš Etrych and Jiří Kotek