

## Preface

The phenomena present at different type of phase boundaries are common and occur in both animate and inanimate matter. Despite their enormous commonness, they are often characterized by great diversity and high complexity. The physicochemistry of interfaces represents a wide and interdisciplinary field of science related to among others physics of fluids, heat and mass transfer, physical chemistry and engineering. The ability to effective control of interfacial characteristics of many systems in macro-, meso-, micro- and nano-scale is essential for their practical applications. This aspect includes both qualitative requirmentss (obtaining a product with desirable properties for a specific usage) and economic reasons (reasonable cost). For this reason the fundamental research concerning adsorption and stability processes in dispersed systems, electrochemistry, electroanalysis, chemical technology and catalysis, materials engineering, as well as biochemical aspects are very important. The determination of mechanisms of related phenomena enables their effective applications in various industrial branches (paints, varnishes and adhesives production, food processing), medicine, cosmetics, pharmacy, agriculture and environmental protection.

Nowadays, there has been an increased interest in materials, technologies and processes that would be ecologically justified. This includes, most of all, the production of various types of adsorbents from waste materials or biomass, the development of technologies that are more environmentally friendly, which reduce the consumption of chemical reagents and the waste generation, biofuels production, biocatalysis and biosensors application as well as usage of various substances of natural origin. All these trends can be realized successfully based on extensive range of modern experimental techniques that allow the detailed characterization of the physicochemical properties of phase boundaries. Additional supplementation of experimental studies with theoretical and computational methods allows for innovative solutions of many research and application problems. This approach fits very well in the implementation of modern development strategies introduced in many areas of human activity.

The presented special issue, deals with novel aspects and perspectives in hybrid materials design and application. The contributions provide an overview of current research problems of both theoretical and experimental aspects and are mainly focused on the search for a new group of adsorbents or cement fillers prepared using both, natural and synthetic metal oxides, polymers or novel type of activated biocarbon. They also deals with design of novel type of membranes as well as silicate- or titanate-based structures dedicated for specific application. The use of such materials in different technological disciplines, including environmental protection, allows for the verification of the proposed synthesis method. Thus, it can be stated that those aspects are of interdisciplinary nature on the border of three scientific disciplines – chemistry, materials science and engineering as well as environmental protection. Special issue scope represents the answer for dynamic and continuously growing demand for advanced, functional materials and opens new perspectives for their practical use.

Special issue is dedicated to selected papers related to scientific conference “*Physicochemistry of Interfaces – Instrumental Methods*” which took place August 22<sup>nd</sup> - 26<sup>th</sup>, 2021 in Lublin, Poland.

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