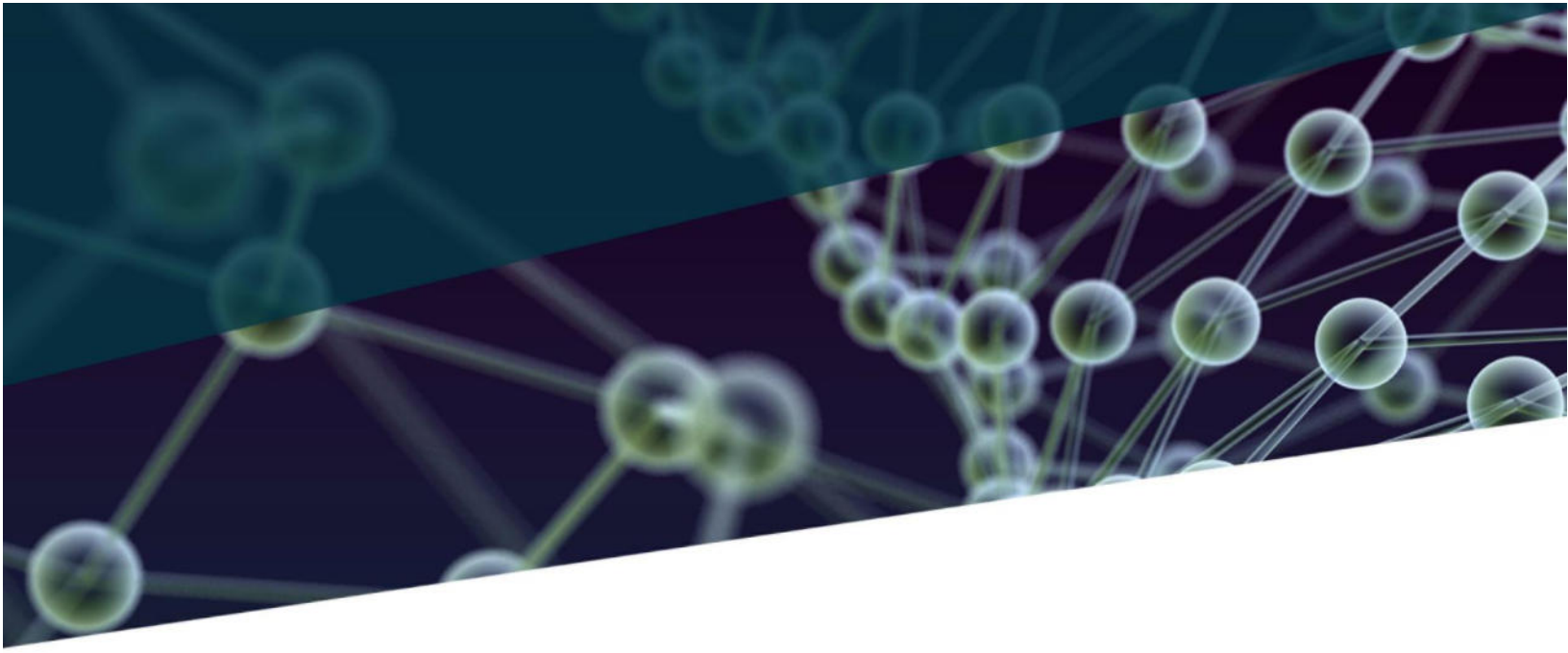
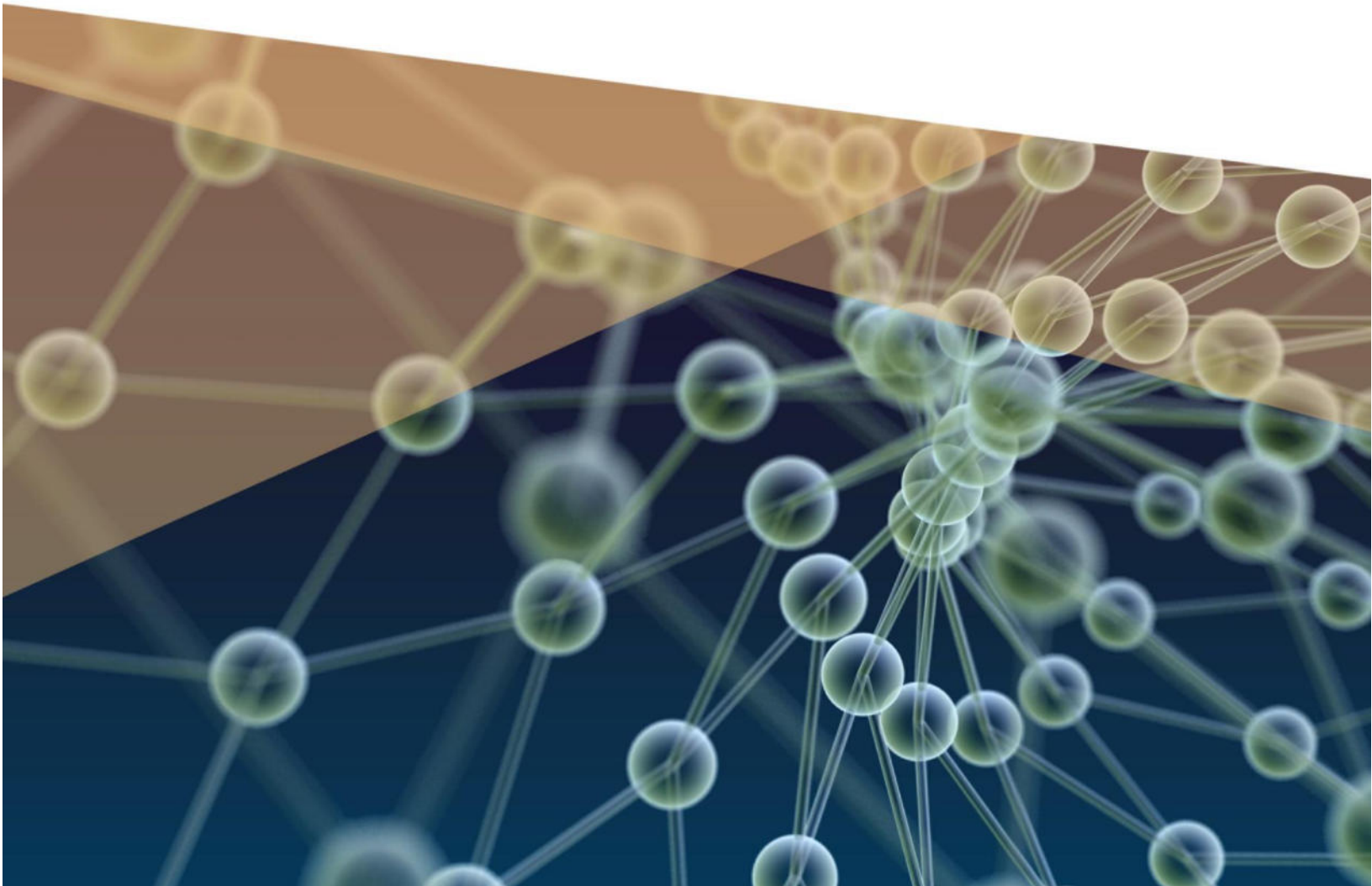


Advanced Polymer Materials and Technologies

Recent Trends and Current Priorities



Ministry of Education and Science of Ukraine
Kyiv National University of Technology and Design
Lviv Polytechnic National University

Advanced polymer materials and technologies: recent trends and current priorities

Перспективні полімерні матеріали та технології: останні тенденції та актуальні пріоритети

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The monograph contains the materials of the 4th International Conference "Advanced Polymer Materials and Technologies", which was held on October 11, 2022 at the Kyiv National University of Technology and Design together with the Lviv Polytechnic National University. The monograph deals with the creation of new polymer composite materials and their processing technologies using extrusion, electroforming, 3D printing, and other methods; development of environmentally-oriented technologies and equipment for the production of polymeric materials for various purposes, including biodegradable ones. Considerable attention is paid to the creation of new polymer composite materials, in particular for environmental protection, using waste from the chemical industry.

The monograph will be useful for teachers, students and graduate students, scientists and manufacturers whose activities are related to the above mentioned topics.

The authors are responsible for the content of the publications.

CONTENTS

POLYMER-MINERAL COMPOSITIONS FOR LEATHER FINISHING

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The paper presents information on application of polymer-mineral compositions for leather finishing. Modified montmorillonite in combination with a polymer in the coating composition increase the high-quality finishing coating on the leather.

Polymeric materials are mainly used for the natural leather finishing coating. The polymer coating increases the water resistance of the leather and operational loads. The need to create a whole complex of coating properties increases the demand for multifunctional materials for the finishing coating at the leather manufacturing. One of the trends is the using of polymer-mineral finishing materials based on highly dispersed clays [1]. These clays increase the heat resistance of the coating, its resistance to wet friction, repeated bending. The aesthetics of the coating on the leather increases.

With the addition of a mineral component, the polymer-mineral compositions of three types can be obtained: microcomposite, intercalation composite, and exfoliation composite. Depending on the conditions of synthesis and the type of mineral component, mixed polymer-mineral compositions can be formed. Mixed compositions contain few types of composites in different proportions [2, 3].

Polymer-mineral compositions often contain layered aluminosilicates as a mineral component, for example, montmorillonite (MMT). A modified dispersion of montmorillonite is used to create polymer-mineral finishing compositions. The dispersion is added to the polymer while stirring at a rotation frequency of 1500 rpm.

The addition of the mineral component into the polymer in the amount up to 1.0 % of the polymer mass allows to the production of microcomposites. At the

same time, polymer molecules can penetrate the interlayer structure of montmorillonite. In this case, the polymer dispersion loses its structural stability. An increase of the mineral component amount to 1.5-2.0% of the polymer mass contributes to the formation of a mixed type of composite and to the obtaining the exfoliating structures.

The occurrence of chemical bonds between the components of polymer-mineral compositions is confirmed by IR–spectroscopic studies. When studying the change in the optical density of polymer-mineral compositions relative to acrylic polymer, the formation of coordination bonds of the polymer with active functional centers of the basal surfaces of aluminosilicate (MMT–Si–O– and Si–OH) was proved. Presented the effect of polymer comprising into the interlayer structure of the montmorillonite. The intercalative structure of the polymer-mineral composition was proved.

The highly sorption area surface of the montmorillonite helps to adsorb the polymer and to create the polymer-mineral compositions. The adsorption improves to stabilize the polymer structure and to increase the colloidal stability of the finishing composition. Such compositions are effective for forming a finishing coating of elastic leathers of the different kinds.

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