coatings

Editorial

Special Issue "Coatings Imparting Multifunctional Properties to Materials"

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Coating the surface of various materials and products has been used for a long time for protection against corrosion and erosion, in order to increase the service life and productivity of equipment. Another equally important area of application of coatings is to impart new properties to materials. It is known that the properties of the surface and near-surface layer largely determine the performance characteristics of materials and their processing ability. Therefore, the application of specially selected coatings is an effective tool for surface modification of materials to give them new and properties (for example, biocidal, hydrophobic, increased electrical conductivity or, on the contrary, dielectric properties, etc.). In recent decades, researchers have paid special attention to the creation of multifunctional coatings.

This book contains the results of the latest research on the formation of coatings on the surface of various materials. The composition of the coatings formed by researchers is very diverse. Coatings are selected depending on the set of properties that need to be given to the material being modified. However, a significant part of researchers choose composite materials based on various polymers as a material for the formation of strong and durable coatings with high adhesion to the substrate.

The articles presented in the book can be divided into two groups. The first one is devoted to the solution of the classical, but still very urgent problem of imparting superhydrophobicity to materials and other properties related to this characteristic. In particular, the article "Superhydrophobic Al_2O_3–polymer composite coating for self-cleaning applications" by R.S. Sutar with co-authors is dedicated to imparting superhydrophobic and self-cleaning properties to glass substrates [1]. The approach substantiated by the authors differs from numerous works on this topic by the fact that the researchers achieve extremely high indicators of glass hydrophobicity by applying a coating manage. The article "Robust superhydrophobic and repellent coatings based on micro/nano SiO_2 and fluorinated epoxy" by X. Huang and R. Yu presents the development of a universal method for imparting high hydrophobic properties to materials of all kinds [2]. A serious achievement of the authors of the study is also a high resistance of the coating to mechanical and chemical influences, which is usually difficult to ensure. An important place in the book is occupied by the review article "Critical aspects in fabricating multifunctional super-nonwettable coatings exhibiting icephobic and anti-biofouling properties" by K.D. Esmeryan, which analyzes the most significant, according to the author, publications over the past five years, which are devoted to the formation of coatings with superhydrophobic and ice-phobic properties that prevent biofouling [3].

The second group of articles presented in the book is devoted to the formation of coatings that provide various fibrous materials with a large group of special properties. These articles differ both in the objects of modification (cellulose textile material, adhesive interlining materials for clothes, polypropylene yarn), and in the methods of forming the coatings used in them.

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L. Petrova and co-authors, in the article "Development of multifunctional coating of textile materials using silver microencapsulated compositions", apply a well-known layer-by-layer method [4]. N. Kornilova and co-authors, in the article "Multifunctional polymer coatings of fusible interlinings for sewing products", use a popular method of dipping to obtain coatings [5]. The article "Properties of polypropylene yarns with a polytetrafluoroethylene coating containing stabilized magnetite particles" by N. Prorokova and S. Vavilova develops a new method of forming coatings based on the application of a coating-forming composition on the surface of a semi-cured thermoplastic filament at the stage of its melt spinning followed by orientational stretching [6]. As a result of coating deposition, fibrous materials acquire a set of new properties that are of great practical importance. Cellulose fibrous materials become antibacterial, antimycotic, and gain wound healing properties. Interlining materials for clothing acquire shape stability, wear resistance, and protective and health-improving properties at the same time. Polytetrafluoroethylene-coated polypropylene yarn is characterized by good antimicrobial properties, reduced electrical resistance, increased strength, and chemical resistance.

This book presents only a small part of the current research devoted to the formation of coatings to impart multifunctional properties to materials. This topic is one of the most relevant areas of modern materials science and, undoubtedly, will be actively developed.

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