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Polyethylene Improved Structural Properties During Production

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Annotation: In connection with the expansion of the fields of application of polymeric materials and the condition of the conditions for their exploitation, the creation of materials with predetermined properties is becoming increasingly important. This can be realized through the synthesis of new, modified and industrial polymers.

Keywords: viscosity, modification, ultra-high molecular weight polyethylene configuration, monolithization, microfibrillar morphology.

The characteristic properties of a polymer product can be divided into three main subgroups -aesthetic characteristics; -technical indicators; -operational properties. It should be kept in mind that most of these properties are extremely subjective, and are determined by a combination of fundamental and additional characteristics. Almost all characteristics of products are associated with the determination of the properties of the material in the solid state. Poor products are obtained as a result of an erroneous choice of polymer material, unsatisfactory processing conditions, and the use of poor design. In this regard, there is an urgent need for methods for predicting the performance properties of polymers based on measuring the fundamental characteristics of the material and process parameters[1]. In connection with the expansion of the fields of application of polymeric materials and the complication of their operating conditions, the creation of materials with predetermined properties is becoming increasingly important. This can be realized both through the synthesis of new polymers and the modification of commercially available polymers. The first path is very complex, expensive and therefore less common, while the second is becoming more and more widely used. In this direction, various methods are used to control the properties of polymers in processing processes. A preliminary analysis showed that wide prospects for directed control of the structure and, accordingly, the properties of finished products from polymers in the course of their production are opened by methods that involve deformation of a thermoplastic material in the solid state. Under these conditions, the necessary structural organization can be created in the material, which ensures the operability of the resulting part. One of such methods, which allow to obtain block products of complex configuration, is forging. The method is characterized by a short molding cycle, a high material utilization rate, and the possibility of processing highly filled materials and materials with a high molecular weight. Of considerable interest in this regard is the processing of ultra-high molecular weight polyethylene (UHMWPE). This polymer has a valuable set of properties: biological inertness, wear resistance, low coefficient of friction, high physical and mechanical properties, resistance to cracking, high impact strength, as well as the ability to maintain these properties over a wide temperature range.

Therefore, ultra-high molecular weight polyethylene is used where many other thermoplastics cannot withstand harsh operating conditions. Its wide application is hindered by processing difficulties due to its high viscosity. Basically, products are obtained by mechanical processing of monolithic blocks, which leads to significant labor costs and is accompanied by a large amount of waste. The use of forging allows one to avoid the above difficulties and not only preserve, but also improve the properties of the original polymer.

We have carried out research on the regulation of the structure and properties of ultra-high molecular weight polyethylene in the process of volumetric stamping. At the same time, taking into account the specifics of the

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processing method, an assessment was made of the structural heterogeneity of the polymer in the resulting products. The work was carried out in the following areas:

- study of the ability to monolithize reactor powders of ultra-high molecular weight polyethylene from various manufacturers;
- development of a technological process for obtaining blanks for subsequent forging;
- study of the influence of forging conditions on structural changes in products made of ultra-high molecular weight polyethylene;
- evaluation of the structural heterogeneity of the polymer in stamped products;
- study of the features of the properties of stamped products from ultra-high molecular weight polyethylene;
- assessment of the influence of the design of the forming equipment on the structure and properties of stamped products.

The optimal parameters of the process of obtaining monolithic blanks required for forging from various grades are determined.

powdered UHMWPE, differing in particle morphology. It has been shown that during forging of UHMWPE, significant changes occur in the structure of the material, affecting both the crystalline and amorphous phases. The original lamellar structure is destroyed and an oriented microfibrillar morphology is formed, the parameters of which are determined by temperature and the degree of deformation. The influence of molding technological parameters on the degree of structural inhomogeneity of UHMWPE in stamped products has been evaluated. The influence of the observed structural changes on the dimensional stability, deformation-strength and tribological properties of stamped specimens is shown. The possibility of regulating the structure and properties of UHMWPE in products by changing the design of the molding equipment is shown. Based on the studies carried out, the optimal parameters of the technological process for processing UHMWPE by forging were determined, which make it possible to obtain products with a more uniform structure and improved performance characteristics. Recommendations were issued for the application of the process for the production of endoprosthesis components from UHMWPE of complex configuration [2]. Epoxy composites have been developed reinforced with modified fiber systems, which are characterized by increased strength characteristics, environmental and water resistance, and antistatic properties[3]. Samples were obtained under pilot industrial conditions and polymer coatings of paper machine shafts were tested (Petrozavodskmash Production Association). The optimal parameters of polycondensation filling of phenol-formaldehyde cation-exchange fibrous materials (CFM) based on profiled PP yarns have been established and their properties have been studied [4-5]. The efficiency of using the developed chemisorption materials for local purification of industrial wastewater from capro-lactam has been proved.

Listofreferences

1. В. М. Сутягин, О. С. Кукурина, В. Г. Бондалетов. Основные свойства полимеров. Томского политехнического университета 2010
2. Катов, Михаил Михайлович Регулирование структуры и свойств сверхвысокомолекулярного полиэтилена в процессе переработки Москва 1998
3. Устинова Татьяна Петровна Регулирование структуры и свойств полимеров и композитов на основе модифицированных дисперсно-волокнистых систем. Автореферат Саратов 2004

https://journals.researchparks.org/index.php/IJOT e-ISSN: 2615-8140 | p-ISSN: 2615-7071
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4. Артеменко С.Е. Металлизированные полиакрилонитрильные во-локна- армирующий наполнитель полимерных композиционных материа-лов/ С.Е.Артеменко, Л.П.Никулина, Т.П. Усгинова //Химические волокна.
5. Голованова, А.Н. Применение полиолефиновых пленок для упаковки и хранения бакалейной продукции [Текст]. /К.Б. Гурьева, Е.Ф. Когтева.// Товаровед продовольственных товаров. 2015. №11/2015. С. 53-58.