of substance is selected. Deposit is dissolved in ethyl hydroxide. During the dissolution, it is necessary to create conditions for constant mixing.

Fluorides of alkali metals are low-solubility in ethanol. But the cost of evaporating ethanol is much less than the evaporation of water.

The proposed method was tested in laboratory conditions. During the separation of the uranium powder from the electrolyte, it is found that a suspension is formed which is poorly filtered. This significantly complicates the separation of sediment from the solution.

The experimentally obtained data for solubility of salts:

From the obtained values, it can be said that the proposed method can be used as the first stage for flushing the cathode deposit (for separation from KF).

For industrial applications it is necessary to develop a fundamentally new method that will minimize the amount of waste and not increase the cost of uranium powder.

Reference

1. *M. Straka, F. Lisy, L. Szatmary. Electrolytic deposition of uranium from molten flurides by means of current pulse electrolysis. Department of Fluorine Chemistry, Nuclear Research Institute (Czech Republic).*

PAINTS FROM WASTE POLYSTYRENE

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The use of chemical industry waste reduces the cost of raw materials and solves the environmental problem – environmental protection. The object of study for the production of building paints in our study was the waste polystyrene (PPP) they are formed in the manufacture of thermal insulation products and packaging.

There is a well-known shortage of construction paints. We decided to unite the above two problems. Subject to recycling PPP is used to create a lacquer base for the production of low-cost building paints.

It is known to obtain polystyrene paints, where polystyrene is used as a film-forming agent [1]. The essence of ways of reception of polystyrene paints consists in preparation of 14–25% of solutions of polystyrene (varnish) in solvent: toluene, solvent, xylene and others. The prepared varnish is mixed with plasticizers, pigments, dyes, fillers, various modifying additives and is used as a finished product for applying a protective paint (material) coating – paint. The quality of the paintwork depends on the quality of mixing (the degree of rubbing). Therefore, at this stage, special equipment is used: paint grinders, bead mills, ball mills, etc.

Disadvantages: a long time mixing stage (rubbing) and polystyrene coatings have a weak luster, which certainly affects the consumer value of the product.

According to the American patent for the production of polystyrene paint container equipped with a stirrer, load polystyrene in the form of dust or granules and the appropriate amount of solvent. The contents are stirred until the polystyrene is completely dissolved, additives (plasticizer, corrosion inhibitor) and filler, pigment(s) are introduced. The mixture is stirred to obtain a homogeneous mass [2]. Disadvantages of this method: the duration of the mixing stage of the filler and additives (plasticizer-inhibitor-pigment) with polystyrene varnish; the increased content of volatile substances at the drying stage; the faint glitter of the obtained coatings.

In this paper, the problem of improving the process by changing the parameters of existing technologies was solved. It was possible to reduce the time at the stage of mixing grinding, to reduce the content of volatile substances during drying, to increase the gloss of the finished product on the protected surfaces of metal, concrete or wood.

The task is carried out by dissolving polystyrene in a solvent, mixing with a plasticizer, filler, additive to the formation of the finished product. In the case of obtaining a PPS painted, before dissolving get painted polystyrene by extrusion at a temperature of 180–230 °C granules, beads or crushed polystyrene, pre-mixed with plasticizer (medical white oil), pigments, dyes, fillers, modifying additives. Then the colored polystyrene is dissolved by mixing with a plasticizer-a mixture of styrene oligomers and methylmetacrylate.

This effect is achieved due to the fact that, unlike the one known in the proposed method for producing polystyrene paint: - happens a better distribution of pigments, dyes, fillers and various additives in painted polystyrene by extrusion at a temperature of 180–230 °C pre-moistened with a plasticizer surface of polystyrene in the form of beads, granules fragmentation or Dissolution of painted polystyrene in solvents provides a fairly complete homogenization paint, Besides reducing the content of volatile substances at the stage of drying and shorter time to receive the finished product; the aggregate of processes leads to improvement of physico-mechanical and operational performance.

To achieve this effect by directly increasing the concentration of polystyrene or the introduction of modifying additives is impossible, because the viscosity of the paint increases, which makes it difficult to process and apply to the surface. The properties of obtained dyes, the relevant Standards of external works at colouring of timber, concrete and metal.

References

1. *Reibman A.I. Protective coatings.– M.: "Chemistry", 1982.– P.78–79.*
2. *UA patent № 3394, IPC C 09 D 125/06, C 09 D 5/08, publ. 27.12.1994, Byul. PV № 6–1.*

3D PRINTED BIOCOMPATIBLE POLYLACTIDE – CALCIUM PHOSPHATE BASED MATERIAL FOR BONE IMPLANTS

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Introduction

For regenerative medicine, however, there are still areas, in which the implants fabricated from calcium-phosphate ceramics are almost irreplaceable [1, 2]. The lack of the full geometric congruence between the implant and adjacent tissues leads to the local rejection of the implant in zones with low mutual integration, which, in turn, results in the undesirable fibrous tissue formation there [1, 2]. Consequently, there is a strong demand in the implants that will perfectly fit in the bone defects and the technology capable of producing such implants with a required precision. Therefore, the further increase of the calcium-phosphate mass ratio in the composite is expected to normalize the pH level of body fluids interacting with bones and stimulate the implant resorption during the new bone growth.

Materials and methods

The desired composite material was obtained by mixing commercially available lactic acid polymer (Natural Works Ingeo 40–43d, NatureWorks LLC, USA) with HAP obtained by sedimentation method described in [1]. In order to perform the compressive strength tests and fatigue tests until the final fracture, 10 cubic samples with the side of 10 mm were printed for each material composition. In addition to that, 20 bar samples with the size of 10×10×55 mm were fabricated for the flexural strength tests as well as for the Charpy impact tests. Finally, to predict the material behavior inside the body, the composite wettability by an isotonic solution (9 % NaCl) was studied by using a system KRUSS DSA30.

Result and discussion

Figure 1 presents the strength characteristics of the samples obtained under optimized printing conditions. The compression and flexural strengths of the samples improve correspondingly from 54±2 MPa to 62±2 MPa and from 42±2 MPa to 46±2 MPa (i.e. on 15 % and 10 %, respectively) when HAP content is increased from 5 % to 30 %. Charpy impact tests indicate the samples impact strength increase on 27 % and vary from 4.4±0.1 kJ/m^2 to 5.6±0.1 kJ/m^2 depending on the exact material com-