Activation of polyethylene granules

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Abstract – The possibility to obtain an active raw polymer suitable for its next metallization in solutions of chemical reduction was observed. The results of experimental researches of mechanical activation of polyethylene granules by small-dispersive zinc in bullet mill features were produced.

Keywords – activation, granules, polyethylene, zinc, bullet mill.

Introduction

Composite materials filled by metals are used in different spheres of the industry for its complex of valuable properties, the first and foremost is the high strength, chemical stableness, increased heat and electric conductivity, ability to recycle into complex conformation products at the high productivity equipment, exploitation reliability. The main problem of the composite materials obtainment is the creation of simple and effective methods to combinate filler and polymer matrix. One of the methods of the combination of metals and polymers is metallization. The metallization allows to combinate the high polymer manufacturability, low cost of the production with operating metal characteristics. That is why the polymer metallization is widely used for high technological products and decorative coverings in the undustry. So it is suggested to use the process of the metallization for obtaining polymer composites filled by metals by us.

Experimental

The activation process before chemical metallization of the polymer surface is important for obtaining a necessary qualitative product. The method of the surface polymer activation is used in that paper, which uncludes combined processing of the polymer granules in the bullet mill in the presence of small-dispersive metal - activator. The result of that processing is a high metal fixation. Determinating of the high qualitative active raw materials was our purpose, which can be used for metallization in the future. The main indicator of the activation efficiency was a metal quantity on the polymer granules after its activation, which was rated as a mass difference between active polyethylene granules before acid etching and after it. Acid treatment was performed to dissolve the metal that was attached to the polymer surface during activation. Our studies allow to establish that the main reason which influences on activation efficiency of the polyethylene grains is the rotation speed, index of mill loading by polymer and metal, polymer and metal ratio, durance of the activation. It is established there is not essential activation rise above limited ratio between polymer and metal. Such ration depends on rotation speed of the bullet mill and it is 5-10% of the mass.

Conclusion

Obtained results allow to affirm that during the process of mechanical activation of the polyethylene granules it is possible to receive an active raw polymer suitable for its next coppering in the solutions of chemical reduction.