

# Nanotechnology and nanomaterials

## The technological process of production of nanomaterials

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Polymer nanocomposites are one of the most promising types of structural materials currently. The improvement of physical and mechanical properties such as tensile strength, puncture impact, modulus, elongation are observed in such nanocomposites. But it is important not only get certain properties of nanomaterials and also reduce the cost of the final product for large-scale production. The last decade of very active is the development direction of applied nanotechnology, namely the development and improvement of technologies for a variety of nanocomposite materials for consumer goods. Getting a high physical and chemical characteristics uniformity depends on the uniform components distribution in the bulk polymer. Therefore, the mixing step is one of the most important in the processing of polymers [1].

A new promising direction for the implementation of this process is using of combined or screw-disc extruders that combine the advantages of both screw and disc machines, providing: high plasticizing and homogenizing power; high degree of mixing; high productivity; possibility of the complex profile products obtaining. Combined extruders provide intensive melt degassing and allow a high degree of mixing and homogenization of the molten polymer.

Due to this structure, there is a shift of the relative movement of the melt particles from one to another strain plane. It is caused by the tension-compression strains, which are determined by changes in the working gap in one disc revolution at a constant minimum operating gap.

Consequently, the quality of mixing disk extruder determined absolute value of deformation is not true. High quality mixing in these machines driven by circulation flows arising in the working gap, making the profile octahedral deformation shifts repeatedly changes its direction, causing an increase in the interface and change its orientation.

1. *Njuguna J., Ansari F., Sachse S., Zhu H., Rodriguez V. M. Nanomaterials, nanofillers, and nanocomposites: types and properties // Health and Environmental Safety of Nanomaterials. – 2014. – 1. – P. 3 – 27.*