TECHNOLOGIES
FOR THE ENVIRONMENT

gigant
GIG & NEW TECHNOLOGIES

PE / TPS bio-composite and the method of its preparation

PE / TPS bio-composite and the method of its preparation

Technology description

The solution enables the use of starch as a component of bio-composite. It was based on the innovative idea of replacing petrochemical raw materials with renewable raw materials, produced on the basis of polymer-starch bio-composites. Obtaining bio-composite based on thermoplastic starch and polyethylene is a multistep process. The first stage is the modification of the native starch - the main reserve material for plants. It requires modification due to its poor solubility, strong hydrophilic properties and unfavourable mechanical properties.

As a result of the thermoplasticisation of starch during extrusion in the presence of plasticizers, it forms an amorphous form - thermoplastic starch (TPS). Then, in the reactive extrusion process, starch modified in the presence of a compatibilizer is introduced into the polymer matrix and as a result bio-composite is obtained.

DEPARTMENT OF MATERIAL ENGINEERING

Ph. Sc., Prof. GIG Jerzy Korol
E: jkorol@gig.eu
T: +48 32 259 26 44

TECHNOLOGIES
FOR THE ENVIRONMENT

PE / TPS bio-composite and the method of its preparation

Advantages of the technology

Thermoplastic starch (TPS) is a completely biodegradable raw material and it can be combined with synthetic polymers - in this system it plays the role of a factor increasing susceptibility to degradation. Such materials are less burdensome to the environment than traditional polymer materials made from fossil fuels. TPS enables the shaping of the final properties of the composite depending on the type and amount of starch and the type and amount of plasticizer used. Decomposition of the biodegradable component of such a composition causes the entire material to lose its cohesion, which in turn leads to its fragmentation and dissipation in the environment. The process is not toxic at any stage (as opposed to chemical methods) and TPS is cheaper than synthetic polymers.

Application

Due to the possibility of shaping the final properties of the obtained bio-composite, its application possibilities are very wide. TPS can be used, for example, by polymer processors, film producers or manufacturers of small goods made of plastics (e.g. biodegradable pots or disposable cutlery).

GŁÓWNY INSTYTUT GÓRNICTWA