

CRYOGENIC GRINDING OF TEXTILE WASTE

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Abstract:

In recent years is dramatically rising content of textile waste all over the world. Technology of cryogenic grinding should be an alternative to classical methods of materials recycling, especially for textile waste (methods like cutting, tearing, waste combustion and others are not profitable in regard of environmental aspects and materials recycling).

Main aims of research:

- grinding of different mixed fabrics and composites to fine powder (close to measures of textile fibre)
- resulting powder particles separate off
- to get 100% base material by separation (e.g. 100% PES, PAD, CO, ...), which we can further fabricate – material recycling.

Cryogenic grinding is a proven technology, which is very effective for grinding low- and high-molecular matters. Substance of this method is cooling of material to extremely low temperature, thanks to this the material becomes so brittle, that we can grind it relatively easy.

The most often used cryogenic mediums are liquid nitrogen (- 195,8 °C), dry ice (solid CO₂, -80°C) and liquid helium (- 268,93 °C).

Self-grinding can be proceed 2 ways:

- 1) Material is exposed to cryogenic medium treatment and after that grind – this way is disadvantageous in regard of effect loss of material precooling.
- 2) Cryogenic medium is directly injectioned into cryogenic mill – material is ground right at extremely low temperatures.

Material can be ground to size of μm . It depends on material which is ground, on grinding mill and also on time of grinding.

In full text will be described types of cryogenic mills, practical experiences with cryogenic grinding, separating of fine powder particles and also next utilization of textile (polymer) powder.