

Carbohydrate-based foam as green and biodegradable packaging material



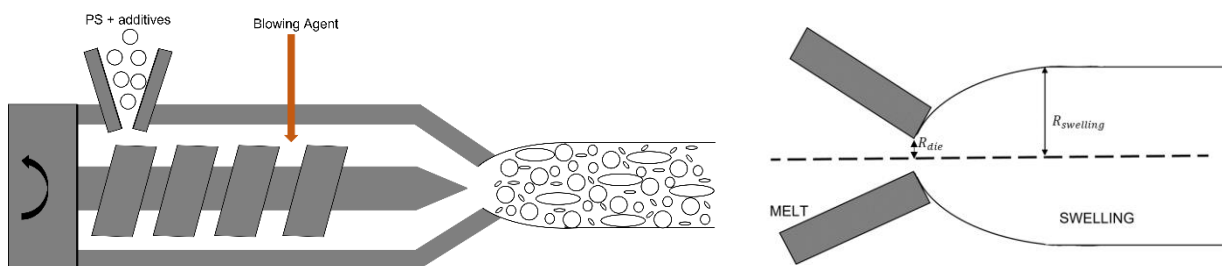
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Curriculum: Ingegneria Chimica

This project aims to find a solution to fossil-based single-use packaging plastics, the ones that have a relevant impact on pollution, thanks to the use of carbohydrate-based materials in particular we are going to use potato starch (PS).



The technology chosen to achieve this aim is the extrusion process and the methodology chosen is foaming to develop a procedure for the production of thick-walled carbohydrate packaging materials. By adding additives (i.e. water, glycerol, cellulose etc.) we can transform the raw PS into a thermoplastic polymer or TPS, so, first, we mix PS with the additives and then we place the obtained material in a twin-screw extruder, thanks to the action of the screws the mixing occurs and the movement of them push the material out through a die, as the material exit from the die the foaming occurs, also the addition of a blowing agent (physical or chemical) can help the foaming process.



We focus on three main topics: on the formulation of the TPS, to give the tablet the desired mechanical properties (in terms of Young modulus, strain at break and elongation at break), on the geometry of the die to give to the tablet the desired shape of the final extrudate, and regarding the design of die, we also deal with another side problem of the polymer extrusion the swelling problem or Barus effect and the last topic is the optimisation of the shape of extrudate in order to meet the desired properties and reduction of costs of the raw material.

The project is inserted into a consortium formed by the University of Naples Federico II, the Wageningen research centre and university (WUR) (Netherland) and DIAB (Italy).

Claudio Esposito, PhD student XXXVII cycle, July 2022

