

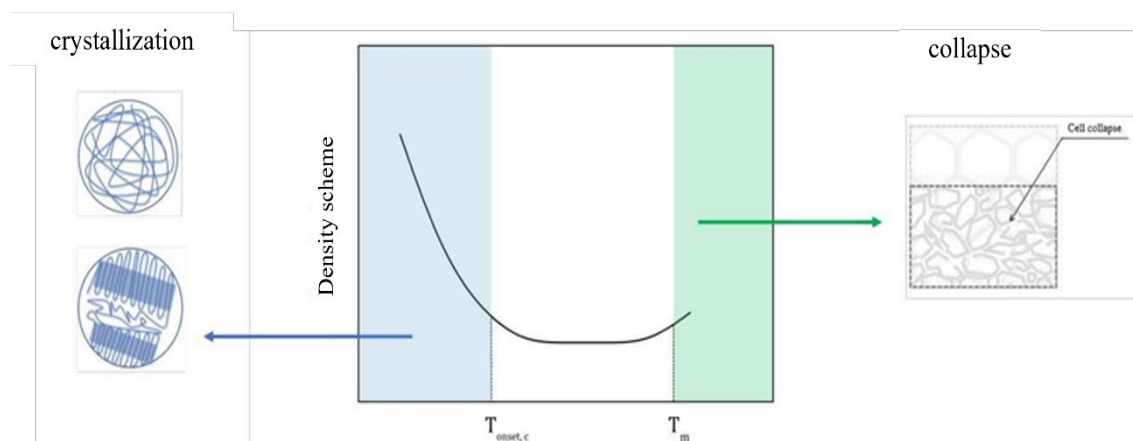
## Gas Foaming of Polymer Formulations: Identification of the Foaming Range and Study of Bubble Nucleation Phenomena

Iram Ahmad<sup>1</sup>, Ernesto Di Maio<sup>\*1</sup>

<sup>1</sup> Foamlab, Department of Chemical, Material and Production Engineering, University of Naples Federico-II, Naples, Italy.

\* [edimaio@unina.it](mailto:edimaio@unina.it)

PET, an inexpensive polymeric material, has a wide processing temperature range due to its high melting temperature and crystallinity, making it a promising material for foam manufacturing. Here, in this work, we focus on the evaluation of different nucleating agents in the PET foaming process to understand their impact on foam density at varying temperatures. For foaming, poly-ethylene terephthalate beads were subjected to expansion tests using a pressure quench method with carbon dioxide as the blowing agent. Samples with and without nucleating agents were analysed to compare their foaming behaviour. The study aims to determine the optimal foaming temperature for achieving the lowest density value while maintaining efficient bubble nucleation. Results indicated the significant role of nucleating agents in influencing foam density and cell number density. The findings emphasized the importance of studying foaming processes and nucleation phenomena in polymer formulations to enhance foam quality and efficiency.



**Figure 1.** Effect of temperature on the density of a foam.

### References:

- [1] L. Sorrentino, E. Di Maio, S. Iannace. Poly (ethylene terephthalate) foams: correlation between the polymer properties and the foaming process, *Journal of applied polymer science* **2010**, 116(1), 27-35, **2010**.
- [2] C. Marrazzo, E. Di Maio, S. Iannace. Conventional and nanometric nucleating agents in poly ( $\epsilon$ -caprolactone) foaming: Crystals vs. bubbles nucleation, *Polymer Engineering & Science*, 48(2), 336-344, **2008**.