Poster MS30

Ionic Liquids: New Foaming Agents of PBAT Nanocomposite Foams in Supercritical CO_2

Sébastien LIVI, Gabriela SAR, Jannick DUCHET
INSA de Lyon, Villeurbanne, France

✉sebastien.livi@insa-lyon.fr

For several years, the academic and industrial researches have focused their attention in the processing of polymer nanocomposite foams due to their excellent mechanical, thermal and barrier properties which are conferred by the unique advantages of nanoparticles such as their high surface area and high aspect ratio. In fact, the market for lightweight materials is oriented towards the development of polymer nanocomposite foams in order to improve the compressive properties, the thermal behavior and the dimensional stability of unmodified foams. For these reasons, supercritical carbon dioxide ($ScCO_2$) has emerged as a promising element of "green" chemistry [1]. Moreover, $ScCO_2$ is a low cost process readily recyclable, nonflammable with an ability to plasticize many polymers. In order to develop microcellular polymeric foams, two pathways have been studied in this study based on Poly(butylene adipate-co-terephthalate) (PBAT) matrix which is an aliphatic-aromatic copolyester: i) the use of ionic liquids (ILs) as new additive agents to obtain a structuration in the polymer matrix [2] and ii) the incorporation of layered silicates modified with ILs such as montmorillonite (MMT), mica in order to promote heterogeneous nucleation [3]. In the first part, the morphology of PBAT-IL foams were tuned as a function the chemical nature of cations varying from imidazolium to phosphonium and the functionalization either CO_2 -phobic with an alkyl ligand or CO_2 -philic with a perfluorinated one (Figure 1). In the second part, the influence of ionic liquid used as surfactant of layered silicates was investigated on the distribution of clay layers in the polymer matrix and to highlight the synergy between the filler and the ionic liquid on the cell sizes.

References

[1] DOROUDIANI, S., PARK, C.B., KORTSSCHOT, M.T., Polym.Eng.Sci., Vol.38, **1996**, p.1205
[2] LIVI, S., DUCHET-RUMEAU, J., GERARD, J-F., Polymer, Vol.52, **2011**, p.1523
[3] NGO, T.T.V., DUCHET-RUMEAU, J., WHITTAKER, A.K., GERARD, J-F., Polymer, Vol.51, **2010**, p.3436

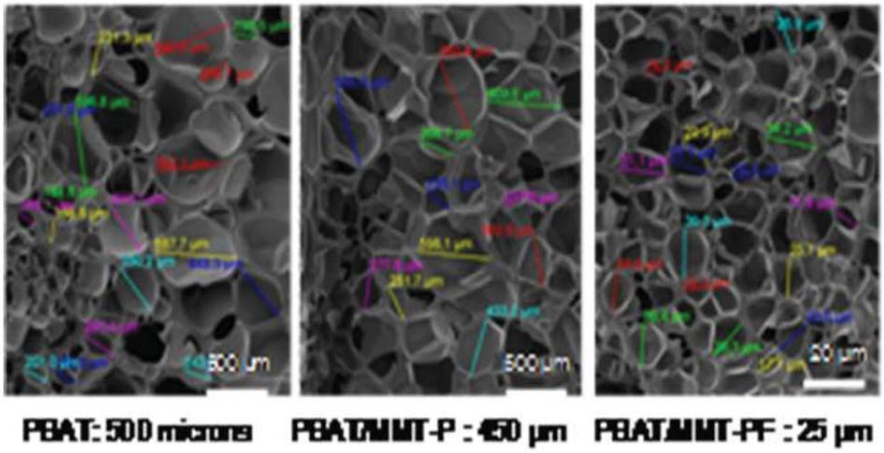

Figure 1