OA06

LAYERED AND GRADED FOAMS WITH THE USE OF PERIODIC BOUNDARY CONDITIONS

by Ernesto Di Maio

Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale
University of Naples Federico II
P.le Tecchio 80
80125 Naples, Italy

Abstract

In this work, we report the use of periodic boundary conditions to achieve foams with multi-layered or multi-graded structures. In particular, periodic boundary conditions in the physical blowing agent mass transport problem were utilized to impart non-trivial blowing agent concentration profiles within the polymer, in turn giving non-trivial foam structures when supersaturation is attained by pressure drop.

As a model system, we utilized polystyrene and CO_2 as the blowing agent and achieved 3-layers as well as 5-layers structures by imposing periodic triangular pressure histories before pressure quench to ambient pressure is imposed for foaming. In these cases, layers were characterized by different void fractions and morphologies, with void fraction ranging between 0 and 90% and pore sizes between 50 and 500 microns within a single foamed sample.