



**EFFECTS OF REPROCESSING ON THE STRUCTURE, MOLECULAR WEIGHT AND PROPERTIES OF
POLYSTYRENE/ ORGANOPHILIC CLAY NANOCOMPOSITES**

Cherifa Remili¹, Mustapha Kaci¹, Stéphane Bruzaud², Yves Grohens²

¹Laboratoire des Matériaux Organiques, Faculté des Sciences et des Sciences de l'Ingénieur, Université Abderrahmane Mira de Bejaia 06000, Algérie and ²Laboratoire Polymères, Propriétés aux Interfaces et Composites, Université de Bretagne Sud, Rue de Saint Maudé, 56321 Lorient Cedex, France.

Nanocomposites (NCs) composed of a polymer matrix and an organically modified layered clay (OMMT) are today one of the most promising ways for the development of new polymeric materials because of their mechanical, barrier and fire properties, transparency and density that give them a high potential for many applications [1]. It is known that polymer recycling [2] is gaining greater attention in recent years due to economical and ecological factors. The first one is economic, especially in the case of high performance polymers, and leads to the reprocessing of scrap material from transformation processes, such as faulty parts, sprues, runners. The second reason for recycling is environmental, and is due to the increasing amount of post-consumer plastic materials in the waste stream. This work attempts to examine the impact of recycling on the structure, molecular weight and rheological properties of polystyrene based NCs, by means of repeated injection moulding cycles. A set of 8 passes were completed through a co-rotating twin-screw extruder. The changes in the chemical structure were studied by Fourier transform infrared spectroscopy (FTIR). The number of main-chain scissions and the changes in molecular weight distribution were estimated by gel permeation chromatography (GPC) and rheological measurements. Upon reprocessing at 180 °C the viscosity decreased, this result is in agreement with that obtained by GPC where there is a very sharp decrease in the number average molecular weight Mw. In the case of nanocomposites, no significant changes in molecular weight were observed even after eight passes through the internal mixer.