

Accepted Manuscript

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PII: S0014-3057(17)31239-9

DOI: <https://doi.org/10.1016/j.eurpolymj.2017.10.013>

Reference: EPJ 8112

To appear in: *European Polymer Journal*

Received Date: 17 July 2017

Revised Date: 3 October 2017

Accepted Date: 8 October 2017

Please cite this article as: Santiago-Calvo, M., Blasco, V., Ruiz, C., París, R., Villafañe, F., Rodríguez-Pérez, M-A., Synthesis, characterization and physical properties of rigid polyurethane foams prepared with poly(propylene oxide) polyols containing graphene oxide, *European Polymer Journal* (2017), doi: <https://doi.org/10.1016/j.eurpolymj.2017.10.013>

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Synthesis, characterization and physical properties of rigid polyurethane foams prepared with poly(propylene oxide) polyols containing graphene oxide

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KEYWORDS

Polyurethane foam, graphene oxide, thermal conductivity, reaction kinetics

ABSTRACT

Water blown rigid polyurethane foams are produced by using *in situ* polymerized polyols functionalized with graphene oxide (GO). The effect of the polyol functionalized with GO on the foaming kinetics, cellular structure, thermal conductivity, and compressive mechanical properties of the RPU foams is investigated. The inclusion of small amounts of GO in the system (0.017, 0.033 and 0.088 wt. %) allows reducing the cell size up to 33%. The thermal conductivity is also reduced in nanocomposites foams. The inclusion of the GO particles deteriorates the mechanical performance of the materials. On the other hand, the effect of GO on the polymerization reaction kinetics are evaluated by infrared expandometry, FTIR spectroscopy and reaction temperature measurements. These kinetic studies show that the presence of the particles induces high percentages of urea groups during foaming, and hence the resulting foams show higher expansion. Isocyanate conversion and the temperature reached for the foam containing GO slightly decrease with respect to those of the pure foam.

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