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Synthesis and characterization of glycerol-based polymers for wood adhesives

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In recent years there has been an ever-increasing need to replace fossil fuels by renewable biofuels to address global warming/ climate change by reducing CO_2 emission levels. In this scenario, the production of biodiesel from renewable resources has increased throughout the world. However, with the increased production of biodiesel has come a drastically increased, excess production of crude glycerol, which is a 10% by-product of biodiesel production (via the transesterification of vegetable oils. This shows that in the near future new applications that utilize large volumes of glycerol need to be developed. Among such applications, the production of polymers and composites from glycerol can be viable approach, not only due to the high demand for polymer-based composites, but also because there has been a growing effort among scientists to develop new biodegradable materials from environmentally friendly, biodegradable and renewable resources whose feasibility in suiting their properties to a particular application can result in easily tailored materials [1]. In this sense, novel biodegradable polymers based on glycerol, phthalic and maleic anhydride, citric, sebacic, adipic and succinic acids were synthesized by melt polycondensation. These polymers were characterized by differential exploratory calorimetry (DSC), thermogravimetric analysis (TGA/DTG), and scanning electronic microscopy (SEM). Moreover, shear bond strength to evaluate the adhesion between these polymers and wood are currently under investigation. Undergoing studies of adhesion, thermal behaviour and degradation have shown that polymer durability as well as adhesion are promising features that make these polymers potential candidates to be used in ecofriendly wood adhesives.

[1] M. Pagliaro and M. Rossi. Future of Glycerol: New Usages for a Versatile Raw Material. (Royal Society of Chemistry, London, 2008).